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ABSTRACT

The papers presented at the Symposium on Issues in Human Development in Philadelphia, November 1967, are collected in this document. Included are lengthy extracts from the discussion. Participants at the conference were from the biologic and social sciences. The goal of the conference was not so much to reveal answers to problems as to make sure the right questions were being asked, in the hope that the ultimate answers might serve as guides to social and political action. The seven parts into which the conference was divided emphasized these aspects of human development: earliest influences; physical and chemical growth and development; socialization in early childhood; cognition and learning; adolescence; the city; institutions, economics and the law. All of the papers are timely; some were freshly updated before this publication. The issues discussed present the need for study and research, and for community action that will help children to live creative and productive lives. (Author/NH)

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ISSUES IN HUMAN DEVELOPMENT

AN INVENTORY OF PROBLEMS, UNFINISHED BUSINESS
AND
DIRECTIONS FOR RESEARCH

Victor C. Vaughan, III, M.D.
Scientific Editor

Based on a symposium

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PREFACE

In November, 1967, Temple University, St. Christopher's Hospital for Children, and the National Institute of Child Health and Human Development were joint hosts in Philadelphia to a Symposium on Issues in Human Development. The meeting drew together for an exchange of views and information more than one hundred fifty participants from the biologic and social sciences. Among the fields represented were genetics and metabolism, nutrition, physical anthropology, pediatrics, many fields of education and of psychology, child psychiatry, community medicine, public health, medical care administration, social work, sociology, cultural anthropology, social and public welfare, city planning, law, economics, and biomathematics.

The result of four days of discussion and examination of issues was to make plain that any dichotomy between biologic and social sciences must be superseded by a multidisciplinary science of human development, as called for by Robert A. Aldrich in his introductory remarks and by René J. Dubos in his keynote address.

The goal of the conference was not so much to reveal answers to problems as to make sure the right questions were being asked, the ultimate answers to which might serve as guides to social and political action. Attention was given in turn to the earliest environmental influences on human development, to physical growth and development, to socialization, to cognition and learning, to adolescence, to the urban environment, and to the impact of institutions, economics, and the law upon human development.

The papers presented at the Symposium have been collected here, with extracts from the discussion. All are timely. Some have been freshly updated before this volume went to press. The issues discussed and the associated problems present insistent demands not only upon the scientific community for study and research, but upon both that community and an informed citizenry for initiation and support of programs of public and private action which will make it more certain that children will grow up in a world in which they will have the best chance of realizing their potential for creative and productive lives.

The planning group for the symposium included Theron Alexander, Leonard Garrett, E. Kuno Beller, Herman Niebuhr, Leon Ovsiew, David Willis, Evelyn B. Wilson and Victor C. Vaughan, III, of Temple University, and Mrs. Georgia Perkins Reaser, Dwain N. Walcher and William Moore of National Institute of Child Health and Human Development.

The conference was supported by Contract No. PH-43-66-949 from the National Institute of Child Health and Human Development and a grant from the Teaching and Research Fund of St. Christopher's Hospital for Children.

The editor and planning group are greatly indebted to Mrs. Michiko Claflin and Miss Helen Ellwanger for planning and logistic consultation and aid, and to Mrs. Claflin for her editorial help.

V. C. V., III

FOREWORD

This monograph presents a wealth of information and opinions on many challenging aspects of human development. Prominent scholars from a variety of disciplines have contributed to this exposition of pertinent and timely issues. The broad array of viewpoints represented here underscores the complexity of the developmental process. Despite substantial advancement in our understanding of the role of genetic and environmental influences, many unanswered questions remain regarding the relative significance of factors which may affect biological, psychological and social development.

We hope the presentations and discussions so skillfully edited by Dr. Victor C. Vaughan, III will be of value to students of human development, public policy makers and above all to creative scientists interested in pursuing research along the directions outlined. The National Institute of Child Health and Human Development is committed to the support of meritorious developmentally oriented investigations and welcomes inquiry regarding our programs.

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OPENING REMARKS

PROLOGUE

The scope of the developmental issues facing a troubled society are indicated by the first two papers: introductory remarks by Robert A. Aldrich, M.D., Professor of Pediatrics, University of Washington; and a keynote address by René J. Dubos, Ph.D., Professor, The Rockefeller University. Both emphasize our need to come to grips with the environmental and social determinants of the biology and behavior of man.

ROBERT A. ALDRICH, M.D.

Two questions in human development stand out in my mind. The first: "What ought we to know about human development?" The second: "How are we going to use what we know now and what we will know in the future in making progress, slow as it may be, towards new human values?"

We are now entering an "era of human development". Of the incredible events in the history of man perhaps the most extraordinary has been his encounter with technology. Now with atomic energy and the beginnings of a molecular biology, we are approaching the point where, for the first time, man has a chance of learning something about his nature beyond the superficial. Through research in molecular biology and in human behavior, man may have been provided the opportunity to learn to change his own characteristics, for better or worse. To my clinical eye, man has shown every sign of plunging ahead to reveal the biological and behavioral mysteries within him.

Now, as with most impossible or even unthinkable challenges, there are many people who doubt that this confrontation will take place soon. But I believe that it will come much sooner than we think; for if there is anything that modern scientific effort has taught us in this country it is to be prepared for surprises.

I can recall, and frequently do, that my college physics professor impressed us all as students with the utter impossibility of inquiring further into the nucleus of the atom. Those years were not so long ago. Today the high school graduate is far more sophisticated about nuclear theories and the properties of nuclear particles. Complex physical principles which only recently were subjects for graduate study are today a part of student preparation before entering undergraduate work.

It is quite evident that the complicated new knowledge gained by science can quickly be fed into the organized body of useful knowledge nurturing young minds. I want to underline "young minds". These same young minds are seeking today to understand man. One of our problems is how to build bridges between these young minds and those of us here in this room as well as elsewhere who are concerned with the development of man. We carry both a tremendous burden and a challenge in surmounting the difficulties of transmitting knowledge between the generations.

With the capabilities of the young mind in perspective, let me try out a thought which links molecular biology to human development and to the quality of our environment. We know, on the one hand, that DNA carries the code or message that defines man's capabilities. I wonder if it is not possible to carry this idea one more step on a theoretical or logical basis, and to ask the question whether it is possible that the code for the proper human environment resides in man?

It is clear that environment shapes man to a considerable degree and that it can also affect DNA through ionizing radiations and other mechanisms. I think that the other aspect of this two-way reaction, the effect of man on his environment, is coming into sharp focus now and is the aspect we know least about. The aim of human development as a field of knowledge is to discover the bases of human behavior and function through research, and to discover how to use this knowledge for improving the progress of all human beings towards realization of major values, such as safety, freedom, and happiness. The knowledge of how people behave and function at different stages of life must become a practical and widespread part of the decisions made by government at all levels, from the small town to the Federal Government. It must be a part of the decisions made in industry and commerce, in labor, and at other points of leverage in human affairs, including the universities. Indeed, the managers of society now and in the future must be educated about the concepts of human development. They must be sophisticates in human biology and behavior, and they must know how this knowledge can be used to advance the human condition.

A few weeks ago Mr. Whitney Young, Director of the Urban League, spoke in Portland, Oregon, on the subject of children raised in the ghetto and their ability to learn. It was with some surprise that the audience heard him declare emphatically that these deprived young people were, in effect, mentally retarded, at least in academic function; and that this disability was perhaps an important factor in perpetuating these ghettos.

Is it possible that the young men and women who burned down some parts of cities this past summer were acting out twenty years later the impact of a disadvantaged environment on a young person? We have a large backlog of disadvantaged young people. To use a managerial term, there are several million disadvantaged in the pipeline today. Most live in urban centers; the majority come from non-white racial origins.

Last week I described for a large group of young Junior Chamber of Commerce people the problem of those intellectually impaired, who cannot learn at the normal rate, even though no biologic or pathologic cause can be found. The belief of some of the Jaycees, and I believe many others, was that the ghetto youth were just lazy or maybe just slobs and that was why they could not learn or get a job. When we think someone is lazy or a slob, we Americans react with the "Protestant ethic" type of indignant reflection. We do not like "lazy slobs" and we do not do much for them.

How differently we behave, though, towards an individual who has a physical disability. We show compassion and often a fantastic zeal in helping him to help himself.

This compassion and zeal is necessary in helping the disabled to help themselves. But a major change in attitude, nothing else, must precede and accompany our approach to the developmental problems of human beings born and raised in the ghetto.

The aims of this symposium are to identify unfinished business, to review the impact of urban pressure on individuals, their families and the culture in which they live, to set some priorities for solving these problems in the evolving urban community, and lastly, to indicate how these solutions might be sought.

I would like to record my own "shopping list" of unfinished business and high priorities.

First, I would like to see human development as a field of education and research throughout our entire system of instruction from the pre-elementary school right on through the most advanced graduate studies. I would like to see the growth of a field of theoretical human development, analogous to theoretical physics. There is no such field now, but I think it must emerge and must become active in our intellectual groups.

Second, I would like to see us make our current knowledge of human development a part of the decision-making process at all levels of government and among the managers of society. We must learn how to engage the minds of leaders in industry and commerce, in labor, in the private sector generally, and in government. We cannot attract their interest by going to them and asking for their political support or their financial support before we have invited them to think about the problems. I would urge that we look hard at how we, the academic and scientific community interested in human development, can become involved with these leaders and managers of society. We should share with them the difficult problems that we are trying to face and get their excellent analytical minds to work on them. After all, if there is anything the United States has demonstrated for the world, it is how to use management as a tool in working towards progress.

Another thing on my shopping list, is to review and reconsider the values we hold before assigning technology to a task. Many examples come to mind from my metropolitan community, and from familiar rural communities, too. Very often when new technology is developed to a point where it can be used, the decision is made, "Well, we will build 80 stories instead of 40 stories because the structural materials are now so much better that it is possible." Real thought about the values enhanced or transgressed by the technology is absent. The plotting of freeways or urban renewal tracts across residential districts and many other valuable parts of communities takes place without full consideration of whether this is in the interests of the value systems held by the affected communities.

Some of the questions I would like to ask around this one particular part of my shopping list are what I call the four "E's".

Any civic project, big city or small, which is through the planning stage and ready to be implemented, ought to have adequate answers to the "four E" questions.

First and obviously, what are the Economics of the project? Is it Economically feasible or possible?

Second, Engineering. Is it Engineered for safety and for practical effectiveness?

Third, Esthetics, sometimes considered but not always. Is it tasteful, beautiful and harmonious?

But the one that most troubles me is Ethics, the fourth "E". I have found during questioning of planners, implementers, builders and managers on these four issues that the label of "Ethics" is the one that frequently puzzles them. Yet it is the one that should have received the most thought.

There are two other things on my shopping list. I would like to see us develop confidence that a new constellation of resources can be grouped together around university skills and that this new constellation can find ways to accomplish the aims of human development. In other words, I am recommending that we do more positive thinking in the academic communities.

I do not believe that any of the previously tried and true mechanisms or resources of the past are giving much evidence of solving urban center problems. For example, many people point to the success of agricultural extension programs in rural areas and suggest that the mechanism can be applied to urban problems. Though this is an attractive idea and some aspects can be adapted to urban problems, the circumstances are not right for application of the agricultural extension program philosophy to the problems of the city. Here in the cities the skills of the university and other urban resources must find some new constellations that will work. Here is the substance of social research.

Finally, focusing interest only on the solution of urban problems may be too narrow. I doubt that one can solve urban problems without considering what is happening in intermediate cities and in the rural areas. They are closely interrelated.

With these brief comments, I would like to close by reminding you of the immortal words of Pogo, the eminent observer, who once said, "We have met the enemy, and they are us".

KEYNOTE ADDRESS

ENVIRONMENTAL DETERMINANTS OF HUMAN INDIVIDUALITY

René Jules Dubos, Ph.D., Rockefeller University

I should thank Dr. Aldrich for having given me the outline of a speech I am to give the day after tomorrow to the Chamber of Commerce in Oklahoma City. I will certainly speak about the four "E's", because really this image summarizes the theme I want to convey to them — namely that in institutions heavily committed to technology it is essential to be concerned with the consequences of technology.

I shall also cite Dr. Aldrich's quotation, "We have met the enemy and they are us", because I am sure the greatest enemy in the development of the science which you have advocated is the attitude of the scientific community. More exactly perhaps, the structure of the scientific community is so inflexible that it will make it difficult to develop the kind of studies you have so wisely advocated; we shall have to create new institutions for these problems, just as new institutions were created half a century ago for the development of physicochemical biology.

Let me try to explain to you why I, a microbiologist, should have become emotionally involved with the problems which are the topic of your symposium. I was born and raised in France. Shortly after I arrived in the United States, I drove from New York to the Pacific Coast and had my first experience of American life during this automobile trip. I was in my late 20's, was about six feet tall, but had an abundant crop of very blond hair, sort of Viking-like. In those days I looked very much more Anglo-Saxon than most of the Anglo-Saxons who have settled in the Midwest and the Pacific Northwest that I was traveling through.

And yet, even though physically I was so much like the Anglo-Saxon young men with whom I dealt, it was obvious that in all my attitudes and reactions to life situations, I was very profoundly different from them — and of course still am.

I was different from them because my French past had imprinted me with tastes and behavior patterns that I have never outgrown — and, for that matter, that I do not wish to outgrow.

Nevertheless, I have changed through these forty years in the United States, and this indicates that even though I had been imprinted early in life, my genetic structure was still sufficiently receptive to new influences that I could be modified by the environment.

This is, of course, the experience of each and every one of us in our lives. And it provides the theme for the scientific approach to the problem of development that I should like to outline for you.

My theme is simply this: we are conditioned — not "determined" but "conditioned" — by our genetic endowment; but what we become is determined by the effect of environmental influences in converting this genetic endowment into the phenotype through which we are known. Furthermore, this phenotype continues to evolve, because every new experience becomes incorporated into our nature.

Dr. Aldrich, I believe this is why you are so right in saying that the time has come to create the theoretical science of human development. Its fundamental law is that hardly anything that happens to us, perhaps nothing at all, is ever lost. It is inscribed in our phenotypic structure and thus continuously creates us and modifies us. The human constitution is the evolving phenotype of the individual, expressing at each particular moment how the genetic endowment reacts to the forces of the environment, never forgetting any of the influences that have acted on the organism.

I would not give a complete picture of human responses if I were to overlook the existence of factors less well defined than the environmental ones which are yet of immense importance in determining man's attitudes.

Francis Bacon in one of his famous aphorisms stated, "A man is but what he knows", thus expressing the belief that we are only that which we have learned. On the other hand, Pascal 50 years later made another statement which is much more congenial to the modern mood and much more revealing of the depth of the factors that affect human behavior. Translated from the French, that aphorism of Pascal is, "The heart has its own reasons that reason doesn't know." For those of you who hear French, I cannot escape reading this very beautiful sentence in French: "Le coeur a ses raisons que la raison ne connait pas."

What is now the meaning of this extraordinary statement of Pascal? The meaning I believe is this: that man has inherited from his Paleolithic past a number of attitudes and responses of which he is often completely unaware. The heart to which Pascal alluded includes all the determinants of behavior that do not originate from conscious reason and that often escape its control. There are woven into our fabric all sorts of responses that no system of education can eliminate, that always come through, and that, moreover, must be given a chance to come through if we want to avoid profound disturbances in the manifestations of personality.

All philosophers and artists have long recognized the existence of those deepseated mental and biological processes that are woven into the very fabric of man's nature.

In one of Plato's dialogues Socrates speaks of the "divine madness". The words "divine madness" as used by Plato do not refer to a pathological state, but rather to those deep biological attributes of man's nature which are beyond the reach of man's reason and yet are so influential in dictating the most imaginative, the most perceptive of human reactions.

Then there is another aspect of man's nature that cannot be very readily accounted for in terms of effect of environment on the genetic makeup and yet is always of paramount importance in all human problems — namely, the fact that man tends to symbolize everything that happens to him and then to react to the symbols as if they were real external stimuli.

So that the responses of a given person to an environmental factor are conditioned by his past experiences and also by the experiences of the social group of which that person is a member.

Most human beings respond to situations not only in terms of the physical or chemical characteristics of these situations (and indeed not even chiefly in such terms), but rather in terms of the symbols through which they see these situations.

Let me just illustrate this statement with an example that Mr. Robert Mitchell and I discussed last night, the attitude of human beings towards slums all over the world.

Any one of us who has known the underprivileged parts of the world, in this country and in Europe as well as in Asia or Latin America, knows of many situations where human beings live under conditions that we consider almost unacceptable and yet have achieved a remarkable adjustment to these conditions.

So the slum does not mean the same in Harlem or in Watts as what we call a slum in, for example, Hong Kong. The very great difference I believe is not only that human beings do become adapted to some conditions, but more importantly, that in Harlem or in Watts the slum is a symbol of segregation, whereas in many other cities the slum is just a phase in one's moving from one situation to another.

In any case, I think we can take it for granted that the responses of human beings to any situation are modified by the memories of the past, by the symbolic interpretation in the present, and by the anticipations of the future.

Because of man's propensity to symbolize, anything that impinges on him affects both his body and his mind and, more importantly, causes them to interact. This interdependence of body and mind has very deep roots in the evolutionary and experiential past of the organism.

In the course of human evolution, during Paleolithic times, the brain, the body and culture developed simultaneously under each other's influence. Through the operation of complex feedback processes, integrated interrelationships of biological constitution and of biological function necessarily resulted from this evolutionary interdependence of body, brain and culture.

Likewise, the experiential development of each individual consists in an integrated series of responses to environmental stimuli. In most life situations the effects of the total environment on the body and on the mind are therefore interrelated, because exposure to almost any kind of stimulus evokes into activity associated patterns of physical and mental responses that were simultaneously established by past experiences.

Now, the view that the bodily and mental constitution consists in the biological memory, both genetic and experiential, of interrelated responses made in the past provides a theoretical basis for psychosomatic medicine. It accounts for the fact that human nature in health and in disease is the historical expression of the adaptive responses made by man during his evolutionary past and his individual life. All influences that impinge on the organism shape the biological and behavioral manifestations of life by acting simultaneously on the brain and on the body.

All that I have been trying to state in rather abstract terms is in reality part of very ancient wisdom, and perhaps the most sophisticated expression of this complex interplay between man and his environment is to be read in the treatise on "Airs, Waters, and Spaces" by Hippocrates. The most interesting part of this treatise in my opinion is one that is often overlooked and in which Hippocrates very clearly and boldly suggests that climate, topography, soil, food, and water affect not only the physical stature and health but also behavior patterns and even political structures. And then, of course, political structures in turn condition the manner in which man deals with the environment.

So that we find stated 2,500 years ago the problem of the interplay between man and the environment, the environment acting on man and then man acting on the environment, that Dr. Aldrich presented as one of the large problems of our time.

It is easy to find anywhere one looks in the modern world illustrations of this interplay between environment and man. And when I say "interplay" I mean that one acts on the other, and that the other reacts to the first.

Let us consider one single example known to all of us — namely, the acceleration of physical and sexual maturation in young people all over the world that have adopted the ways of Western civilization. Children are taller, adults become larger, and sexual maturation occurs two or three years earlier in the countries where the Western ways of life have been adopted than they did about a hundred years ago.

It's impossible to believe that such transformation of the human type is not going to affect the environment in very profound ways. Consider this very trivial example. Japanese teenagers are now, since the War, essentially as tall as American teenagers; immediately you see that the whole system of housing, the school buildings, the benches at which children would work, and the trains in which people ride no longer fit.

For all I know, the Japanese submarine can no longer accommodate very tall Japanese young men. One can predict that profound changes are going to happen in the Japanese scenery, in the design of the gardens perhaps, simply because of the fact that children grow taller and achieve sexual maturation so much earlier.

One of the large problems that I would like Dr. Aldrich to add to his agenda is the search in our environment for the new factors that are being incorporated in human life and changing its phenotypic manifestations. To illustrate that I have not forgotten my professional identification with microbiology, allow me to quote here an example that I read only two weeks ago which reveals how subtle some of these factors can be.

There is a famous virus called Shope papilloma virus that causes papilloma in rabbits. And it was discovered a few years ago that this virus changes the enzymatic constitution of rabbits; it increases the production of the enzyme arginase.

At the Oak Ridge Laboratory Dr. Stanfield Rogers has been working for the past few years on preparing and purifying the Shope papilloma virus because of its importance in the study of experimental tumors. To his great surprise, he discovered last year that investigators who handle that virus in large amounts, centrifuge it, crystallize it, and so on, come to harbor the virus. They do not become sick from it. There is no evidence that the virus is pathogenic for man. But the virus apparently affects the metabolic structures of human beings and makes them produce the enzyme arginase.

I am not claiming that this is of very great relevance as a factor of human development. But what I want to emphasize is that almost certainly there are around us all sorts of influences of which we do not recognize overt manifestations which are yet influential in determining some aspect of human personality.

Now the most obvious of the influences in our environment come, of course, from the fact that we are becoming, as we all know, an urbanized, industrialized society and that most of us will soon be living under urban conditions.

I wish I could take the time to define what we mean by "urban". Here I shall present for your analysis a point of view which I inherited from my European past, the meaning of the word "city".

If you are European-born and raised, especially Continental, a city means a very compact social environment. Everybody lives in an apartment, in a very large apartment house. The European city is compact. Any European who comes to America realizes that hardly any American cities can compare in character with European cities. Seventy-five percent of the inhabitants of Philadelphia live in detached houses. And all over the United States people live in detached houses, often their own.

Urban life in detached houses may be different with regard to influence on human attitude and perhaps also on human physical welfare from living in compact cities like Paris or Hamburg or Rome or Florence. But there is one aspect of life which is the same in all Western countries — namely, that life is "technicized". I believe that the influence of technology is vastly more profound on life than is the influence of the city. If this is true, instead of emphasizing as we are prone to do the effect of urbanization on human life, we should direct our attention to the effect of technology on urban life.

When I speak of "technology" I am not speaking of the effect of functioning in a big factory. I am speaking of the fact that almost all our perceptions of nature, of the environment are now mediated through some kind of technological equipment. There is a very large difference between cutting a lawn with an ordinary push-mower and doing it with a power-mower. There is a very great difference between experiencing the spring or fall through one's senses and seeing it on a television set. I believe it is the influence of technology which should be discussed more than the influence of urbanization on human life.

In any case, whatever be the influences that act on modern man, they have their most profound effect when they occur during the very early years of life, during the formative stages of life; I include the prenatal as well as the early postnatal phases, because the human body and the human brain are incompletely differentiated at the time of birth and develop as the infant responds to environmental stimuli.

One of the urgent problems for which it is essential that we create new institutions if our present institutions cannot cope with it, is to study the effect of environmental forces during the formative years of life.

During the past five or six years I have developed colonies of experimental animals in which the only manipulation occurs either during gestation or during the early phase of lactation. The experiments could be summarized this way: you have a colony of animals. You take the mother during gestation or the mother during lactation and you do something to the mother. You never touch the young. And then after that, once the young are weaned, you place them all under identical conditions, and you follow them throughout their whole lifespan.

Without fail, the manipulation that occurred just before or just after birth, which may have been extremely mild and never was repeated, may shorten or lengthen the lifespan. It may make the animal an obese animal or a small animal. It may make it resistant to certain forms of stresses or susceptible to them.

This can be done with minor changes in the diet of the mother during gestation and lactation. It can be done also by introducing viruses that do not cause obvious evidence of disease, except that the animal is smaller. It can be done also by taking the young immediately after birth and then allocating them to different foster mothers. The young with a certain foster mother will grow as large animals; the young with another foster mother will remain small throughout their lives.

There is an immense range of possible experimentation very relevant to man in this area, such as the studies being conducted in Wisconsin at the Primate Center by Professor Harlow who can modify almost irreversibly the behavior of primates by manipulating the conditions under which they are bred.

No telling what is the range of factors that play on human beings. Let me mention once more the fact that in all the countries of Western culture children are now growing faster, becoming taller, and are sexually mature much earlier. One can formulate obvious, simple hypotheses to account for this phenomenon. A simple one is that nutrition has changed, and that the nutrition of the mother or of the young early in life is what is responsible.

The control of childhood infections, which has been certainly the one greatest achievement of medical science during the past fifty years, is also important.

Some English and French epidemiologists and geneticists have pointed to another factor that may also play a part — namely this: until about 75 years ago the range of possible marriage partners was extremely small, because there were only a small number of people within a certain community. With the bicycle, the number of people that one knew increased by tenfold. And with the automobile, of course, by a hundredfold. This has enormously increased the possibility of heterosis, and some geneticists have suggested that heterosis can result in more rapid development and larger size and other changes in characteristics of the young.

This is another component of the total environment which can be investigated, but which is hardly being investigated at all, because it is not fashionable. It is because it is not fashionable that I hope Dr. Aldrich will use his influence to preach all over the land that we must create new institutions completely dedicated to the study of human development.

I could discuss the consequences of such changes in development as affected by environmental factors on human behavior, on human life, but instead I shall hastily move on and consider another aspect of the problem that certainly needs much more careful attention than it has received so far — namely, the problem of crowding.

One always says or hears said that cities are bad because we are so crowded in them. I doubt that crowding has increased. One must have been very crowded in a Paleolithic cave. The Neolithic settlements were extremely crowded. And anyone who has looked at pictures of Medieval Europe or who has lived in Medieval towns, as I have, knows that there is nothing as crowded as a Medieval town. Hong Kong is today the most crowded city in the world.

So crowding is not a new experience in the human race. For all I know, it's better to be crowded, and my strong suspicion is that man in general likes to be crowded. Witness the fact that when they have to live on the farm, they all move to the town as soon as the farm chores are over!

I think "crowding" is not a useful word. What is probably significant is what *kind* of crowding. All sorts of qualitative components must be introduced there which I am not one to define but which certainly are components that are almost independent of population density. They are much more concerned with problems of social organization, of relation of one person to the other, of whether it's everybody of the same occupation being in one building or a diversity of occupations within the same block.

I was born and raised in the industrial suburbs of Paris, a very poor environment, but I do remember the immense richness of human contacts within the street as I went to the butcher and — I didn't have to go to the butcher; my father was a butcher — but to the grocer, and so on.

"Crowding" is not the word. We have to ask some other kinds of questions.

If one lets animals grow together and become crowded together, there really is little difficulty. The animals get on well together. A social order becomes established that ecologists and students of animal behavior have well defined.

In contrast, if one brings suddenly together animals from different origins, even though they be of exactly the same species, then conflicts occur.

So the problem of crowding must take into consideration all sorts of historical factors that have made one organism, one individual, expect certain kinds of social relations and suffer from it if that kind of social relation is not satisfied. The fact that a large part of the colored population in our slums have come not so long ago from the South and from rural areas certainly is one of the factors to be considered in thinking about crowding.

Let me restate again, because it is a statement that has a germ of hope in it, that there are communities in which extreme kinds of crowding have proved compatible with physical health, social order, and the development of great civilization. One can cite Hong Kong or think about the density of Holland, where you can hardly move without seeing people around you. Yet Holland is, from all physical points of view, the healthiest country in the world and also a country in which civilization has flowered for more than 1,000 years.

The most important aspects of the environment for man are not in my opinion those related to disease, even though the diseases are the ones that are most commonly studied, because we are so disease-conscious in our society and because a meeting like this will be organized by a medical school, whereas it should, if I may say so, be organized by Robert Mitchell.

The most important aspects I think are those that have to do with the formative expressions of the environment. Perhaps to convey to you what I mean by this, let me restate once more a story that I have told many times during the past five years.

As you recall, the House of Commons in London had been put out of commission during the War by German bombing, and immediately after the War there were many discussions in England as to whether the House should be rebuilt exactly as it was before the War or whether one should take advantage of its being destroyed to make a modern building with all sorts of conveniences, air conditioning, space for everybody, good chairs. All the things that one does now.

Mr. Churchill, in a speech which I believe is one of his most perceptive speeches, urged that the House be rebuilt exactly as it was before the War, instead of being replaced by a more efficient one. To summarize his argument, it was that the style of parliamentary debates in England, and therefore the whole structure of English democracy, had been conditioned by the physical characteristics of the old House and that changing the architecture of the House would affect not only the manner of debates but also the structure of English political institutions. He summarized his argument — which is much more interesting, much more documented than what I have given you — with a statement: "We shape our buildings, and then afterwards our buildings shape us."

I think this is what we have to concern ourselves with, not buildings only, but our whole environment. It makes us become what we are.

I am the way I am because I was born and raised in Paris. I'm sure I would have been a different person — I'm not saying better or worse: but different — if I had been raised in New York City or in Florence or in Peking.

The environment shapes us.

The physical, metabolic and nervous architecture of the human body is being molded by environmental factors during the first years of life. Let me at this point introduce a parenthesis to suggest that we may not be far from being able to bring up to the study of these problems the big guns of experimental science. In my opinion, the really most extraordinary discovery in genetics or in molecular biology during the past few years is that genes are set on or off by a variety of substances and conditions. Moreover, one has learned something about these activators and repressors. For example, it seems that several hormones act by making genes function or be inactive.

As soon as one accepts this view, it becomes clear how the total environment, always reflected in the internal environment, modifies thereby the very environment in which the genetic equipment is imbedded and functions.

To summarize in the form of a dogmatic statement an area of knowledge that begs for investigation, gene activity is profoundly influenced by the composition of cellular fluids that surround the nuclear apparatus; various substances differ in the specificity of their activating or repressing effects; and these substances in turn are affected by the external environment.

In conclusion: whether they are physical or mental, human potentialities can become expressed only to the extent that circumstances are favorable for their existential manifestation. Society and planners thus play a large role in the unfolding and development of man's nature. The latent potentialities of human beings have a better chance of being actualized when the social environment is sufficiently diversified to provide a variety of stimulating experiences, especially for the young.

If the surroundings and the ways of life are highly stereotyped, the only components of man's nature that flourish are those adapted to the narrow range of prevailing conditions. Hence, the dangers of many modern housing developments, which may be sanitary, but are nevertheless inimical to the development of human potentialities because they are designed as if their only function was to provide disposable cubicles for dispensable people.

In his recent book, "The Myth of the Machine", Lewis Mumford states: "If man had originally inhabited a world as blankly uniform as a 'high-rise' housing development, as featureless as a parking lot, as destitute of life as an automated factory, it is doubtful that he would have had a sufficiently varied experience to retain images, mold the language, or acquire ideas."

In this statement Mr. Mumford was referring to the evolutionary development of man. But I know that he would agree with me if I were to add that, irrespective of genetic constitution, most young people raised in a featureless environment and limited to a narrow range of life experiences, will be crippled intellectually and mentally. For this reason I believe we must shun uniformity of surroundings as much as conformity in behavior, and we must make instead a deliberate effort to create as many diversified environments as possible.

This will unquestionably result in loss of efficiency, but the most important goal is to provide the many kinds of soil that would permit the germination of the seeds that still remain dormant in man's nature.

The duplication of uniformity must yield to the organization of society.

Richness and variety of the physical and social environment constitute crucial aspects of functionalism, whether in the planning of a city, the design of dwellings, or the management c[illegible] all aspects of life.

DISCUSSION

ALDRICH: Dr. Dubos mentioned the need for new institutions, pointing out that this symposium was brought together by predominantly medical forces. He suggested it would be more appropriate in the future to have a broader approach through urban or city planning.

Exactly what kind of new institutions should we be thinking about? How can the universities or institutions of higher learning come to grips with the topic we are dealing with here? It seems to me that the disciplines that contribute a body of knowledge about pediatrics and child care are by and large pathologically oriented and fairly categorical. Normative affairs are included, but do not star in this galaxy. Although biochemistry, biophysics, psychology, psychiatry, and so forth contribute to a medical school, it is preeminently a college of abnormal human development. From all the disciplines represented in a highly differentiated university it should be simple to put together a college of normal human development.

Where is such a college?

DUBOS: Let me present two different aspects of my thinking about this question, not to develop them but to try to formulate them.

All systems of education and of research have been organized on an analytic pattern. What science has been highly successful at, by remaining for 350 years faithful to the Cartesian doctrine, is to take any kind of problem and dissociate it into its components. This is what universities are organized to do both in research and training.

Now, the very phrase "normal development" refers to a highly integrated organism. There is nothing that is normal unless it is highly integrated. This kind of integration makes it almost impossible to consider the problem from only an analytic point of view.

During our time, we have seen the development of institutions where the structural aspects of knowledge are emphasized as much as the analytic aspects. This has happened for the biological studies related to atomic energy. I believe that it is happening with regard to space science. It is probably happening to a certain extent in the armed forces for the training of men for operation under certain conditions — let's say in the Arctic or in a submarine.

Such institutions have been perhaps associated with the university but operate somewhat outside of it. They are what Alvin Weinberg has called the "mission-oriented institutions" — namely, institutions in which a group of people are united not because of similarity of the techniques that they use but because they share interest in common problems.

This is what I have in mind when I speak of creating new institutions. It does not mean that they need to be in the same building. Obviously, integration can be achieved through ways other than under the same roof, but I believe there is a great deal of merit to being under the same roof.

Despite what people say, one does not communicate by telephone. One does not communicate by letter. The face-to-face encounter remains by far the most efficient way and perhaps the only way to communicate knowledge.

ROBERT MITCHELL: I find that although I am in a graduate or professional program, a lot of undergraduate students are coming to me and saying, "We don't find what we are being given relevant."

It seems that these young students want to study the whole man, and many of them want to define a core area, such as urbanization, where they can put many ideas together in a more meaningful way than through a single discipline.

Significantly, these students have set up a free university, in which many courses are being given, and in which faculty and others participate freely on a disorganized basis. I estimate, furthermore, that between 1,300 and 1,500 of the 5,000 to 6,000 undergraduates at the University of Pennsylvania are engaged in community service activities, which they have organized themselves. These young people want something to do that is constructive.

DWAIN N. WALCHER: Dr. Dubos, I would not want to advocate a revolution, but I think one has to be concerned about how one interposes catalytic agents into the evolutionary process to try and bring about more quickly some of the changes that seem indicated from the remarks that you and Dr. Aldrich have made.

The imprinting phase, for example, may lie in the very earliest experiences of infants. How do you break into the developmental cycle in which we are currently involved for research or demonstration projects which might yield models for expanded efforts later in the community?

DUBOS: The first part of my answer will have to do again with those new institutions. This is not a new concern of mine. It has become crystallized in the past three or four years.

Some three years ago, I remember asking officers of the Ford Foundation, "Couldn't you do for environmental studies" — I will use a vague, not a good word, but let me use this word — "the same thing that was done 60 years ago for physicochemical biology?" At that time there was recognition that one had to create a science of physics and chemistry focused on biology, and the universities wouldn't do it. The medical schools were not equipped for it. There was no place to do it.

But somebody convinced Mr. Rockefeller, who gave eventually some $60 or $70 million to build the then Rockefeller Institute, now called Rockefeller University. And because there was a place where social glamour was given to this kind of occupation through association with the name Rockefeller, it became accepted, and every medical school in the world now has a Rockefeller Institute of its own within its walls.

I believe that somebody must do such a thing by massively investing in one or two institutions, and then the movement will go on its own steam.

As to the development of experimental models, I can only state my conviction that for almost any human problem it is possible to develop experimental situations in animals that bear some resemblance to the human situation. My own experimental studies in this line are now being published in the *Journal of Experimental Medicine.* Their objective is to show that many of the problems of under-privileged populations can be reproduced in the laboratory by exposing newborn mice to nutritional deficiencies, subclinical infectious processes or behavioral disturbances not unlike those commonly experienced by deprived people.

Even such simple studies require a kind of facility different from those available in medical schools. In particular, they require that animals placed under a wide range of conditions be maintained throughout their whole life span, and indeed for several successive generations.

I have quoted my own studies, not because they deal with especially important problems, but because they are concerned with concrete questions that can be put to an experimental test through model systems. I am convinced that many of the problems of sociology can also be converted into limited experimental models.

Each one of these models is limited, like all models, and does not represent the full human situation. The virtue of a model, however, is that it organizes fragments of information in such a manner that they can be handled and then transposed to more complex situations.

I believe that there is a field for the development of experimental models in social problems, and I consider urbanization as a social problem with biological determinants.

PART I: EARLIEST INFLUENCES

Papers by

Jerome Kagan, Ph.D., Department of Social Relations, Harvard University
Gerald Stechler, Ph.D., Department of Psychology, Boston University
Michael Lewis, Ph.D., Educational Testing Service, Princeton

Respondents

Philip H. Salapatek, Ph.D., University of Pennsylvania
Arnold Sameroff, Ph.D., University of Rochester

In this section are recorded observations which instruct us as to the profound importance of the earliest weeks of life for the growth of patterns of behavior, in particular for those experiences which may represent the analog in man of the phenomenon of imprinting. Not just socialization begins here, however, but other important aspects of personality and character. The observations of Jerome Kagan are especially striking, that sociocultural and sex differences in behavior can be distinguished as early as the fourth month of life. Gerald Stechler and Michael Lewis offer sensitive assessments of the crucial nature of the quality of maternal responses to the signal systems of the infant.

EARLY INFLUENCES AND SOCIAL CLASS **Jerome Kagan, Ph.D.**

In dealing with earliest influences on development, one clearly has two choices.

Current work by investigators both here and abroad has created a large and relevant corpus of data. One could easily spend available time attempting to synthesize and summarize this material. On the other hand, narcissistic involvement in our own work is strong, and I have decided to present some of our findings on how early influences correlated with social class during the first year of life.

The classes of early influence fall into three major categories.

First, there are physiological stresses. The work of Levine, Dennenberg and others suggests that specific physiological reactions, which may be massive during the first postnatal days or during prenatal periods, set certain central nervous system functions and influence future behavior.

For example, if one injects rats with sex hormones during the opening days of life there are irreversible effects on mating behavior in adulthood. If those hormonal interventions occurred at a later time, say after eight days in the albino rat, the effects are minimal.

This research may have implications for human development.

The second class of earliest influences represents a healthy change from the learning theory approach, and emphasizes the signal value of the mother. It concerns the opportunities for attachment of the infant to specific objects.

Twenty years ago the mother-child relationship was characterized in terms of the secondary reward value of the mother. The function and value of the mother to the child covaried with the degree to which she was associated with primary reward.

This conceptualization makes the child passive in acquiring conditioned associations surrounding the mother's reward value.

Thanks to the ethologists, we are beginning to conceptualize the mother as an object to which the child becomes attached (in addition to whatever reward value she may accrue), in the same sense that a precocial bird becomes attached to an imprinting object. The infant is emitting responses actively and searching for a stimulus object to which those responses can be directed. The degree of attachment of infant to mother is a function of the opportunity the child has to practice these responses to the mother.

Mary Ainsworth has gathered persuasive data indicating that children in Uganda show a much stronger attachment to their mothers than do American children. The latter lie for most of the day away from their mothers, deprived of the opportunity to attach themselves to her.

The third class of early influences concerns the kinds of distinctive stimulation that the adult or object environment poses for the child.

I emphasize the amount of *distinctive* stimulation that the mother gives to the child, rather than amount of raw stimulus energy because it does not make much sense, as long as the organism is not in total isolation, to talk about amount of raw stimulation that an organism encounters.

We shall consider this last class of influences and try to persuade you that the quality of distinctive stimulation from caretaker to infant in the first year influences the child, and covaries, to some degree, with the mother's social class.

We have been conducting a longitudinal study of 160 infants, white, firstborn, living within 30 miles of Cambridge. We have seen these children at four, eight, and thirteen months of age, and are now 80 percent through the assessment at 27 months.

Four questions are being asked in this study.

First, for seven years we have been working with a dimension in school-age children that we have called reflection-impulsivity. Some children, when faced with problems that have response uncertainty, characteristically show fast decision times and make a lot of errors. We have called them impulsive.

Another group of children normally have long decision times in problems with uncertainty, and make few errors. We have called them reflective.

This is a reliable disposition; it generalizes across tasks, and appears to be a fundamental aspect of the child's psychic organization. Perhaps we can preview it during the first year of life, with the implication either that the foundations of this disposition are learned early, or that there are biological bases to its dynamics. To determine which was one goal of the longitudinal investigation.

A second goal was to look for islands of continuity in selected response systems, such as irritability, social responsiveness, smiling and attention span. For example, some newborn infants are smilers; others non-smilers. As a matter of fact, Daniel Freedman has found, among 21 prematures, that some smile a lot; others never smile. We have found dramatic differences in smiling at four months.

What does it mean to be a frequent smiler? We are interested not primarily in phenotypic continuity — that is, whether the smile at two weeks predicts a laughing four-year-old — but in genotypic continuity. Does this disposition predict a theoretically reasonable derived set of behaviors or structures when the child is four, five, or six years of age?

The third question was concerned with different organizations of dispositions in the sexes. There might be differences in the organization of the central nervous system and therefore in patterns of behavior between the sexes. Earlier observations made with Michael Lewis at the Fels Institute persuaded us that vocalization and patterns of play differed and we looked for replication of this finding in the first year of life.

Finally, we were interested in the effects of social class on the infant's development. The effects of social class in a five-year-old child are enormous, and they affect primarily cognitive variables.

There is no community in this country, or perhaps in any Western country, where the mean score for a group of lower class five-year-old children is not lower on vocabulary, school grades, or ease of learning a complex discrimination than the mean score for middle class children. Why?

The Head Start data have indicated that by three years of age some of these differences are palpable. It is reasonable, though not original, to ask how early one can detect differences between children of varying social classes.

It is not reasonable to expect that lower class one-year-old children will be retarded on every psychological dimension that we examine.

Our sample contains 80 boys and 80 girls: 30 percent are lower middle class, 40 percent middle class and 30 percent upper middle class. By lower middle class we mean neither parent was graduated from high school and the father is an unskilled laborer. No family was on public assistance.

There are two middle-class categories. One group contained high school graduates; the father employed in a skilled laboring job or white collar. The second middle class group had parents with several years of college.

In the upper middle class group, both parents were college graduates. The father and/or the mother may have been in graduate school or had professional degrees, and the father was employed in either an executive or professional position.

We shall consider a variety of variables touching attentional processes and cognitive development.

In the current state of methodological immaturity, psychologists are typically interested in a central state variable. They try to operationalize this central state, and end up with a set of partial operations, each of which is only partially correlated with the others, and looks to be a partial representation of the central state.

Let me elaborate this point.

In order to measure Sokolov's notion of orientation, you can look at the electroencephalogram, the galvanic skin response, respiration, or heart rate. Each one gives you a slightly different picture, a small piece of the pie. Each is not necessarily correlated with the other under conditions that are not traumatic.

Consider the problem of measuring hunger drive in a rat 24 hours deprived of food. One could measure speed of running the alley, duration of pressing the bar, frequency of pressing the bar, or amount of food consumed. Each is a partial operational definition and each not always highly correlated with the others.

We are in the same position in assessing attention to interesting stimuli to infants. Let us consider what infants do that might be indexing the central processing of stimuli.

They can look at the stimulus.

They can babble to the stimulus.

They can smile at the stimulus.

They can show autonomic reactions.

In the last case, we are primarily concerned with cardiac deceleration. This choice goes back to R. C. Davis, who found that when a person looked at an interesting stimulus, his heart rate went down. John Lacey caught the significance of this phenomenon and demonstrated that when Antioch College students were looking at interesting pictures or listening to interesting stimuli, they displayed cardiac deceleration which was not always an epiphenomenon to respiratory change.

Then Michael Lewis and I found a similar result with infants. We have enough data to suggest that the cardiac deceleration response is an important index to assess if you are studying attentional phenomena in the infant.

Now, it turns out that if you look at social class differences on these four variables to the processing of stimuli, each one tells a different story. Let's look at the story first in this piecemeal fashion.

Infants in our study first came to the laboratory when they were four months old.

Procedure at 4 months. At 4 months of age the infant was placed supine in a crib with a gray cloth enclosing the open portions of the crib. When he was alert and happy the first set of stimuli were presented.

Episode 1: Two-dimensional faces. Each subject was first shown a series of 16 achromatic slides of human faces, four presentations of four different faces. They shall be referred to in the text as PR, SR, PS, SS. PR was a photograph of a man's face; SR was a schematic outline of a regular male face; PS and SS were scrambled collages of the photograph and schematic regular faces. PS and SS had all the major facial elements but in quite unreal anatomic relationship to each other. Thus PR and SR were regular faces; PS and SS were distortions of the human face. Each stimulus was presented for 30 seconds, with a 15 second rest interval between each stimulus during which the visual field was partially illuminated. The stimuli were presented 20 inches from the plane of the child's face and were projected by a slide projector electronically programmed for the correct intervals of stimulus presentation and inter-stimulus periods. The 16 stimulus presentations were preceded by one buffer stimulus (an achromatic photograph of a male with one eye — a cyclops face). Two orders of presentation were used.

Episode 2: Three-dimensional clay faces. After a short recess the child was shown a series of 16 presentations of three-dimensional, sculptured faces painted flesh color (4 presentations each of 4 different faces). We shall refer to them as REG, SCR, NE, and BL. REG ("regular") was a regular male face; SCR ("scrambled") was a collage of that face, with eyes, nose and mouth rearranged; NE ("no eyes") was the same regular face with no eyes, and BL ("blank") was the same face with neither eyes, nose nor mouth.

As in the two-dimensional series each stimulus was presented for 30 seconds with a 15 second rest interval between each stimulus during which the visual field was homogeneously white. This series was also preceded by a three-dimensional buffer, which was an amorphous form.

Variables coded. The major variables coded during both visual episodes were: duration of each fixation of the stimulus, frequency of smiling, vocalization time, fretting. In addition, the child's heart rate was recorded continually. The four behavioral variables were coded by two observers who were posted on either side of the child's crib looking through observer holes down on the child's face. Neither observer could see which stimulus was being presented. Inter-observer reliabilities for each of these variables were high (.97 for fixation, .71 for vocalization, .86 for smiling and .80 for fretting). A Grass polygraph equipped with a Lexington Instruments cardiotachometer recorded the infant's heart rate. The major variable coded was the magnitude of the cardiac deceleration during the first fixation. This value was obtained by subtracting the three lowest rate heart beats during the first fixation from the three lowest rate heart beats during the five seconds prior to stimulus onset (or prior to the first fixation when first fixation did not coincide with stimulus onset).

Procedure at 8 months of age. Each infant came to the laboratory with his mother when he was 8 months of age and was subjected to four procedures in the following order: two-dimensional faces, auditory sentences, three-dimensional faces, and a free play period. The following sections describe these procedures.

Two-dimensional faces. Each child was seated in a highchair behind a gray wooden enclosure which had lights at the top. The child's mother sat to his right and slightly behind him and his face was eye level with the screen. The two-dimensional faces were the same achromatic slides the child saw at 4 months. At this age, each stimulus was presented for 15 seconds with a 15 second rest period between each stimulus. The stimuli were shown in the *same order* to all subjects.

Three-dimensional faces. Subjects were shown the same four three-dimensional clay faces for a total of sixteen trials (4 illustrations of each stimulus). Each stimulus was on for 30 seconds with a 15 second rest period between each stimulus. All Ss received the same order.

Variables coded. Two observers sat in front of the enclosure peering through portholes at the child's face. For the visual episodes, the variables recorded were: length of each fixation of the stimulus, vocalization, smiling, fretting and cardiac rate.

Procedure at 13 months of age. The assessment at 13 months included three visual episodes. The infant sat in a highchair behind a large wooden enclosure, with his mother slightly to his right and behind him. This situation was identical with the one used at 8 months of age.

Human Forms I (HF I). The first episode contained four three-dimensional representations of an adult male, about 12 inches high and 3 inches wide. The four stimuli were: regular man dressed in trunks (REG); the same man completely disarranged with the four limbs, trunk and head in an asymmetrical arrangement (SCR); the same male figure with the head placed between the legs (HBL); and a free form of the same area, color and texture as the three previous stimuli, but with no obvious resemblance to a man (FF). Each stimulus was shown for 20 seconds with a 15 second inter-stimulus interval during which the field was blank. Each stimulus was presented three different times, resulting in a total of 12 trials for the series. Three different orders of administration were used. The major variables coded were similar to those used at 8 months: duration of each fixation, vocalization, smiling, fretting, and cardiac deceleration during the first fixation.

Three-dimensional faces (3 Dim). After a recess during which the subject was taken from the room and brought into a lounge area, he was brought back to the laboratory and shown a set of five different three-dimensional faces, four of which were identical to those shown at 4 and 8 months of age. The fifth face contained only a pair of eyes in the correct position with the nose and mouth absent. This stimulus was called "Eyes Only" (EO). Each stimulus was presented three times for a total of 15 presentations. Each stimulus was presented for 30 seconds with a 15 second period between presentations; three different presentation orders were used.

Human Forms II (HF II). The last visual episode involved additional transformations of the same male form used in Human Forms I. Three different transformations were prepared — a man with three identical heads (3H); an animal's head on the man's body (AH); and the man's head attached to an animal body (HH). Each stimulus was presented for 20 seconds with a 15 second rest period between each stimulus, and each stimulus was presented three times, 12 trials in all. As with HF I and three-dimensional faces, three different presentation orders were used.

Before we can discuss the significance of the social class differences on fixation time, we have to take a moment to talk about the determinants of fixation time.

During the first year or two of life there are at least three major determinants of the length of fixation of a visual stimulus, and each tends to enter the scene at different ages.

During the opening eight weeks of life, the dominant stimulus attribute that controls and maintains fixation is the physical contrast or movement of the stimuli. This does not have to be learned. Infants will look longer at stimuli that have high black/white contour contrast than they will at stimuli that are homogeneous grays, and infants will look longer at moving stimuli than they will at static stimuli. But the tendency for high contrast stimuli to attract and maintain attention becomes subordinate to other dimensions by the time the child is four months of age, perhaps a little earlier.

A second factor is the degree of discrepancy between the stimulus and an acquired schema of the child. In a typical family-reared child, by the time he is four months of age he has developed a sufficiently well articulated schema of his mother's face so that he will look longer at a stimulus that resembles a face than any other event.

Beginning about 10 to 12 months of age in the Western infant a third determinant becomes an important force governing the length of fixation. This has to do with the richness of the nest of associations that the infant has learned to the stimulus.

Let me try to say this in other words.

The child of about one year has learned a set of internal mediated associations to particular stimuli. For some infants this set is large and rich, for others sparse. The hypothesis states that the richer the list, the longer the child will look. For example, if the stimulus engages a rich nest of associations the baby continues the fixation until he has emptied the reservoir, much as you might maintain a long gaze at a painting as long as associations to the picture were generated. When you stop generating associations, you turn away.

Granting these assumptions, we can predict some longitudinal functions for fixation time.

Let us look at the average first fixation across three-dimensional faces at each of the ages, which happens to be the one episode that was repeated at every age.

Fixation time is highest at four months, when discrepancy is operating. Fixation drops dramatically at eight months of age, and at 13 months of age stays level. (In some infants fixation is rising; these are the precocious infants. In other infants, it is falling.) At 27 months of age fixation time begins an ascent again. There is, therefore, a U-shaped function between fixation time and age.

The suggested interpretation is that discrepancy is operating at 4 months and richness of association at the later ages. As children acquire a rich nest of associations, their fixation times begin to rise again.

If one accepts that interpretation, then we might expect social class differences in fixation time to grow with age. Upper middle class children should be acquiring a richer nest of associations than lower middle class children. That is exactly what happened.

The correlation between length of fixation time and social class at the three ages rises with age. It is non-significant at four months of age. It is significant for girls at eight months but not for boys. And at 13 months it is significant for both sexes.

We are interpreting this increasing association between class and fixation time as indicating that at 13 months of age upper middle class infants have a richer nest of associations to faces than lower middle class infants and therefore, maintain their fixations for longer periods of time.

Now, I want to pose a puzzle to which I will return later. The correlation between class and fixation is greater for girls than boys. This is, moreover, generally the case for other variables. When we look at the relation between social class and a cognitive variable, be it IQ or school grades in a ten-year-old, or length of fixation time in a 13-month-old, the correlation is higher for girls than for boys. This is the puzzle.

When the infant is surprised, but not necessarily when he looks a long time, heart rate will decelerate. For example, in one study we gave infants a novel mobile to take home. When those children came back to the laboratory a month later and saw the mobile with which they had gained familiarity and saw transformations of that mobile, girls gave the largest cardiac decelerations to the transformations, to the discrepant stimuli, rather than to the mobile that they saw at home for a month.

This interpretation of the cardiac response is supported by the age changes. Cardiac deceleration decreases with age, so that at 13 months there is minimal cardiac deceleration to the clay faces. The upper middle class infants decelerate more than the lower class at four months, but not at 13 months. The only significant class differences in deceleration were at four months.

The interpretation is that the upper middle class children are experiencing more frequent face-to-face contact with their mothers. Upper middle class mothers are more likely to lean across their babies' faces and engage in reciprocal vocalization, smiling and face-to-face play and so accelerate the development of schema for a face.

The lower class baby is less likely to have this kind of experience. Therefore the lower class infant should have a less well developed schema for a human face, and because the schema is murkier should be less likely to be surprised by the clay face. The absence of a surprise reaction is reflected in the minimal cardiac deceleration.

Let us consider the smiling response. The smiling response is a very interesting reaction. Those of you who follow the literature know that the smile means different things at different ages. As we have indicated before, even prematures can smile. The problem that faces us is understanding the conditions that release the smile and what the meaning of the smile is at different ages. There are now a sufficient number of studies, both in Europe and the United States, to indicate that when a human being, or a clay mask, leans across a baby's face, there is a peak age at which the smile is likely to occur. That peak tends to be at four months of age.

At 8 and 13 months of age the children listened to a taped series of auditory passages. The four passages are a set of sentences with familiar or nonsense words that are spoken in high or low inflextion. One would expect an infant who had a good schema for human speech to react with humor to the voice, which is exactly what we found. At 8 months, although the social class differences were in the correct direction, they were not absolutely reliable. But at 13 months they are.

The upper class children are much more likely to smile to this set of auditory sentences than are the lower class children at 13 months. Although this effect occurred for all four stimuli, the stimulus that had the most dramatic effect was low meaning, high inflection.

Now consider our last variable — vocalization.

The child of four months will babble to these faces. The face is on for 30 seconds, and the mean babbling is 2.5 seconds. At eight months of age babbling is reduced considerably, but at 13 months it rises again.

We believe that up to eight months of age babbling reflects generalized excitement. An infant can babble because he starts moving his trunk. An infant might babble because he is processing the stimuli.

A careful spectrographic analysis of the frequencies and amplitude changes in the vocalization might reveal different results. But our crude code of babbling (or what Lenneberg would call cooing) does not reveal class differences, or dramatic stimulus differences at any age.

Let us summarize these data and end with a dilemma about sexual dimorphism.

The data suggest that lower middle class infants have a poorer schema for a face at 4 months and less associations to faces at 13 months.

Our interpretation is that upper middle class mothers, in contrast to their lower middle class counterparts, are doing two things differently:

First, the upper middle class mothers are engaging in more face-to-face vocalization with their infants.

Second, they are teaching more symbolic associations to objects than lower middle class mothers.

As indicated earlier, there are empirical data to support the statement that upper middle class mothers are providing more distinctive vocalization to their children. For example, we had two observers visit the homes of these children at four months of age for a day and observe them in a time-sampling procedure. Each observer wore an inconspicuous battery powered device in her ear, which gave an auditory signal every five seconds. Every five seconds, then, she recorded a set of behavioral categories having to do with the mother-child interaction.

Upper middle class mothers of girls were more likely than lower middle class mothers to stand over their daughters and vocalize to them in a distinctive manner. That is, they were not touching them, tickling them, or patting them. They were talking to them.

This observation is congruent with Moss' finding on a group of middle class mothers in Washington and Bethesda. He finds that the mothers of girls are much more likely to imitate their infants' vocalization at three months than are mothers of boys.

As indicated earlier, IQ scores, achievement test scores, and problem-solving scores are more highly correlated with the social class of a girl than that of a boy.

Perhaps the best data are from Moss and his co-workers. Mothers were interviewed while they were pregnant, one of the variables concerning affectionate feelings toward the coming child. At three months of age observers visited the home and coded amount of face-to-face contact between mother and infant in a procedure that resembled ours. Several weeks later, at three and a half months, just two weeks earlier than our own observations, Moss measured fixation time to pictures of faces.

The rating of affectional content predicted the mother's face-to-face contact with her daughter. It did not predict well for the son.

But more important is the correlation between the amount of face-to-face contact in the home between mother and daughter and how long the infant looked at the slides of the faces in the laboratory. The r = .61 for girls, and -.10 for boys.

Here we see a relation between a specific behavioral variable and fixation time that we think is correlated with class.

Let me pose three possible interpretations. I am not wedded closely to any of them.

Let us suppose first that girls are born biologically less variable than boys, that a population of females is more homogeneous than a population of males. If so, a homogeneous population should react to a specific experience in a less variable way than a heterogeneous population.

Consider an analogy. I have two pieces of clay. One is of homogeneous malleability; the other is of uneven malleability. I place one hand on each of the two pieces of clay. The fidelity of the imprint will be greater for the ball of clay that is homogeneous than for the one that is less homogeneous.

A second interpretation is that lower class and middle class mothers will react differently to their daughters but will be more alike in their behavior toward their sons. Accordingly, they might differentiate their daughters more than they do their sons. There is empirical support for that suggestion.

Mothers appear to project more of their personality onto their daughters. If the mothers were themselves homely, they are apt to say, "My kid may have trouble dating"; or, "If I had trouble with arithmetic, she will have trouble with arithmetic."

The boy is a foreign object for mothers of both classes. Each mother has to learn about the inner life and behavior of this strange organism, and will have less of a tendency to project her own life onto the boy. Greater similarity in behavior toward boys, then, may occur across class lines.

The third expectation has the least support but contains some germ of attractiveness. Existing data suggest that girls are perceptually precocious to boys.

If that is true, the girl may be forming earlier and stronger attachment to the mother, and the boy may be slower in developing a schema for this mother's face, in developing an attachment to the mother. The girl may become "tuned in" earlier than the boy to the mother's reinforcements and reward contingencies. That early tuning, as a function of her precocity, might lead her to be affected by maternal behaviors earlier than the boy.

Those are the hypotheses, not mutually exclusive; each has some bit of empirical support. Perhaps we can consider their relative merits in the general discussion.

AUTOPLASTIC AND ALLOPLASTIC BEHAVIOR: HOW THE INFANT MANIPULATES INPUT Gerald Stechler, Ph.D.

One point Jerome Kagan makes very strongly, which underlines the whole methodology and philosophy of approach, is that in the human infant the gathering of visual information (and by implication other kinds of information, particularly respecting human and humanoid forms) is an active and involving process. The whole baby is caught up in this process. Kagan's work is fascinating and provocative, and, as he has pointed out, suggestive of a variety of hypotheses and interpretations.

Kagan not only records attention but wisely looks at a broader response configuration: at movement, smiling, vocalizing, facial grimacing and cardiac deceleration. These latter categories would, if we were using physiological terms, fit under a general heading of excitatory and inhibitory functions. Physiological terminology, however, may not be appropriate for our purposes. If we seek a general psychological term to encompass these categories, I would submit the concept of *affect*.

Our work on perceptual development has concentrated on the age range from birth to two months. Even at this young age we have been impressed by the relevance of the question of the relationship between perception and the above category of responses, which I am, for shorthand and for theoretical purposes, calling *affect*.

We have been able to demonstrate that in normal, full term babies even within the first four days of life the act of gazing at a patterned target is not an isolated, unrelated "trick" of which the newborn is capable. Rather, from the very beginning, looking — and by implication, information-gathering — contributes to a bodily state that cannot be described simply in terms of excitation or inhibition, since it already includes regulatory functions in which both excitatory and inhibitory manifestations are present.

When a patterned target catches a newborn baby's attention, his on-going motor activity tends to subside, while at the same time reactive systems appear to be tuned in. Autonomic reactions, as measured by skin potential changes in response to a light air-puff to the abdomen, will be more rapid and more vigorous than if the baby, although equally awake, did not have a patterned target to which he could direct his attention. Given the patterned target, he gets tuned in, suppressing certain functions, such as motor activity, and alerting or recruiting others, such as autonomic reactivity.

These observations allow us to apply the concept of arousal in the manner in which it has been defined by Pribram. As Pribram points out, arousal is not a greater or lesser *amount* of excitation pervading the organism, as was proposed by earlier models. Rather, it is the *distribution* of excitation which is altered.

Pribram calls this altering of distribution or reorganization of excitatory and inhibitory processes within the organism *information*. Pribram further states that the amount of redistribution can be *measured* as information.

At this point, I would like to submit a proposal for relating perceptual and affective phenomena in early infancy, which stresses the adaptive aspects of perceptual affective functioning. Time does not permit presentation of the data which led us to this viewpoint. For purposes of analysis, however, adaptation can be laid out as a series of events occurring in sequence, although in reality there may be a high degree of simultaneity of these events. Since the sequence is likely to be a loop of some sort, the starting point is somewhat arbitrarily chosen. A convenient place to start is where Kagan begins, with the presentation of a stimulus to the subject. In a more naturalistic circumstance, of course, the encounter with the stimulus could be of a somewhat different variety, occurring as the consequence of active searching by the organism rather than by imposition of a stimulus. Or, equally well, the stimulus could arise from the interior of the body, such as through pressure in the bladder or a hunger cramp.

In a larger model we try to emphasize the active searching functions of the young organism, but for our present purposes it is not critical how the information arrives at the perceptual apparatus but merely that it does arrive.

The next step of the sequence may be regarded as a decision-making process. There is no intent here to imply consciousness, awareness, or even cortical involvement in this decision-making. This step is infinitely complex, to be sure, and involves matching against existing schema, monitoring of the state of the organism, and so on. There is obviously much more to be said about this particular step, which may, in fact, be the crux of psychology and biology. But for the moment let's jump onto the next step, which consists of the array of autoplastic and alloplastic operations introduced by the organism to alter or reconcile the nature of the input.

An autoplastic operation would be the baby's closing his eyes or turning his head away from a target. Such a move is stimulus-terminating. The opposite autoplastic reaction, sustained and heightened attention, would be stimulus-maintaining. Though such autoplastic acts are fundamental adaptations to incoming information, the ultimate adaptation for higher organisms must involve alloplastic operations — that is, actions on the environment so as to alter the nature of the input.

Piaget's now classic statements of the development of sensorimotor intelligence deal with these inner and outer changes. It is noteworthy, however, that in dealing with the outer changes, the alloplastic ones which alter the world, Piaget's major emphasis is on motor acts which serve to alter the input. This direct effect — doing something in the real world — assumes a neuromuscular apparatus capable of producing the necessary changes. One of the peculiarities of human development, however, is the extraordinarily slow development of the motor system, so slow that it is capable of acting directly and effectively on the real world only relatively late in infancy or early in childhood.

A great deal of development goes on prior to the time when the human infant is able to engage in any direct motor effectance to alter his inputs. He can engage in motor acts such as looking away, but these I submit are autoplastic. They change his perceptions but do not change the real world about him, as closing the window would if he were cold or going and getting a bottle out of the refrigerator would if he were hungry.

Does this mean that the infant is foreclosed from achieving that aspect of effectance which is based on altering the outer world? Hardly so. For if he could not change the real world — for example, by making food appear at his mouth — he would not survive very long.

The obvious paradigm is that at the outset and during earliest development the infant alters the outer world by indirect means. He has someone, usually his mother, perform necessary motor acts for him. In order for her acts to be able to serve him there must be a communication link from baby to mother. He must be able to tell her when a change of input is required.

The simplest signalling system I can conceive of is one which has two active states, communicating the messages: (a) change the nature of the input; or (b) do not change the nature of the input (or, maintain the input as it is now).

Now, that's not a very efficient signalling system. If undesirable input is coming in — let's say you are cold — and you give out to a randomly operating system a signal which says "Change", something may change, the lights go on, the radio off, or something like that. It can take a long time before the appropriate changes will finally occur, the closing of the window or something similar.

But, inefficient and ineffective as it is, I submit that the above is a complete and satisfactory system. If you can survive until the random generator hits the right pattern, you will finally get what you need. Then you can turn off that message that says, "Change."

I would say now that what we call *affect* is that part of the adaptive system which accomplishes autoplastic and alloplastic changes. Affect produces the autoplastic internal changes responsible for gating of information intake, or dosing it, to maintain appropriate levels for the individual. It is also the communicative system whereby the indirect control of the outer world is maintained.

Specifically and intentionally absent from this definition of affect is any consideration of the satisfying discharge or overflow phenomenon which can somehow in and of itself relieve a noxious state. This is the way we have been taught to think about affect. When you try to rid yourself of this classic model to develop another, you find how difficult it is, because the classic model is rooted in our thinking and in our terminology. It is almost impossible to say the word "affect" without somebody thinking of something bubbling up and flowing over.

The two-value system which carries the species-specific meaning of "change the inputs" versus "keep the inputs as they are" can, I believe, provide us with our basic affective dichotomy of pleasure versus displeasure.

The various expressions of distress are the signal to the mother to change the stimulus impinging on the infant. Those of us who are parents know that in the beginning we may well rate as rather incompetent random generators. We get the signal "Change something," and we try this, and that, and everything, until the baby finally quiets; then we know that we have made the appropriate change.

As time goes on, we get tuned in to certain subtleties of this signalling system and no longer have to go through a random series of acts before providing the appropriate input to the infant. We judge from the context, from the baby's history, and from the nature of his signal, that one act is likely to be more appropriate than the other. The pleasurable signs, the smile, the soft coo, a panting excitement, carry the message "Continue. I like it. Keep up this pattern of stimulation."

We must admit a third but non-active state which indicates that the infant is at that moment indifferent to input, and that his signalling system will be activated by whatever the next encounter with input may be. And it may be input that will make him smile or that may make him cry. It may come from inside him or from outside. But at a given moment he may be indifferent, not calling either for change or for continuation.

The autoplastic system may act either toward stimulus maintenance or toward stimulus termination. Attention can be heightened or diminished. Termination of the stimulus, that is, putting an end to the perception of it, is a readily available and extremely effective device. It may be said to be the prototype of the psychological defenses which we employ throughout our lives.

Important and effective as they are, it need hardly be stressed that all autoplastic changes have inherent limitations. Prime among these is that they do not in reality alter the environment, but rather alter the perception of it. Denying the existence of hunger does not bring nourishment, nor does closing one's eyes to danger decrease the threat. On the other hand this kind of regulation does serve the useful and perhaps indispensable function of gating or dosing input which might be overpowering if allowed to exert a full and sudden impact.

Affect is not nearly so dependable a signalling device as it is a stimulus gating device. The autoplastic aspect is fairly dependable, as dependable as the organization of the particular individual. He can effect the internal changes that tune him in or out of the stimulus field. But as a signalling device affect is much less reliable, for it needs a more or less available, more or less willing, more or less able partner to accomplish its aims. If the mother reads her baby well, can tune in to his specific signalling system, can perform with reasonable consistency, can herself expand with the epigenetic expansion of the infant's signalling system, and if as he becomes older and more complicated and sophisticated, the mother can continue to read along until language finally becomes part of the system, then the baby can develop adequately. If not, then both the perceptual and affective sides of this hyphenated perceptual-affective system can remain more diffuse and underdeveloped.

In this view of things the mother is not merely the provider of stimulation but a key link in the information feedback loop which provides the baby his only means of altering the outer world, at least until that age when he can accomplish direct motor effectance on the environment. The parallel between this indirect effectance system and Piaget's concept of sensorimotor intelligence is notable. One comes to control the perceptual field by performing motor acts upon it. The creation of an interesting display by making an external object move constitutes a sensorimotor feedback loop. If the control of the ensuing input comes indirectly from an affective signal emitted by the baby, it can serve as the basis for the development of a causal intelligence as surely as if it had been some direct motor act on his part that had altered the input.

Relevant in this regard is Galanter, Pribram, and Miller's concept of the TOTE unit (test operate, test exit). This idea focuses on the reduction of perceptual mismatch (the discrepancy between the current state of affairs and the desired goal). The reduction of mismatch is accomplished via an act. After each act a test is inserted to see if mismatch has been reduced. Action finally ceases when the discrepancy between wish and perception is nil. The information and/or control loop is now complete for that moment.

In the case of the young baby you have to expand this loop. It is no longer contained within him, but the mother is an element. The baby puts out a signal, the mother acts and the infant gets the feedback from the mother's action, which is now his input.

The development of this system, which I call the sensory-affective system, is dependent on a cooperative partner for completion of the loop. To the extent that the second person cooperates appropriately, this feedback loop system can develop and articulate. To the extent to which that aspect of the loop is defective, as it may be for a variety of reasons that we all know so well, then this information system cannot develop adequately. Since it has to do with "how do I feel about what I perceive, and what can be done about it that I cannot do myself", which is the feeling system we carry with us for the rest of our lives, the mother is put in a different position from that of simply providing appropriate or inappropriate stimulation.

Now, at this point the thinking is quite speculative, but it seems reasonable to conjecture that if the affective signalling system of the baby is relatively unsuccessful in changing inappropriate inputs to appropriate inputs, then not only will the development of the perceptual-affective system be impaired, but the baby will be forced to a greater reliance on the only other adaptive mechanism available to him. He will handle inappropriate inputs through autoplastic devices. That is, he will increase his perceptual defenses.

As a final note on the possibility of sex differences, I like Kagan's last hypothesis best, because in the newborn nursery where we were looking for hyper-alert neonates we found it was much easier to find females than males with long attention times. If this observation is a valid representation of the state of things, then Kagan's finding of greater and earlier influence of social class in female infants becomes understandable if not fully explained. If the female is more alert from the start, more reactive to input, knows more of what is going on, and in that sense is more tuned in to this information feedback loop of perception and affect, then if the mother does not play her part, the baby will be put in dire straits and be thrown into the autoplastic mode; she will have to handle the world by changing her own states, being unable to effect the indirect change through the mother.

MOTHER-INFANT INTERACTION AND COGNITIVE DEVELOPMENT: A MOTIVATIONAL CONSTRUCT[1] Michael Lewis, Ph.D.

It is clear developmental psychology has suddenly shown a strong swing in the direction of biologically based differences rather than the learned differences in human behavior. This swing is clearly needed, for observation of early infancy reveals differences of such magnitude that the experimenter is highly reluctant to accredit them to learning. This being true, I should like to talk to the issue of a learned phenomenon, one which may be central to development.

While it is not possible to separate the interaction between genetic (maturational) and learned variables, investigators are for the sake of exposition often confronted with the necessity of using this simplistic approach, one which no doubt represents a serious distortion of individual differences and the developmental process. The issue which will be presented in this paper necessitates some of this kind of schematic simplification, for I wish to discuss the learning of a motive. In this learning, no particular skill is acquired, but rather, some very fundamental process by which subsequent development, whether learned or innate, can be facilitated or inhibited. It is an *expectation* of effect and as such, is not involved in the nature-nurture controversy. We hypothesize and intend to demonstrate that this motive or its lack is acquired through a contingency paradigm involving both the infant's and the mother's responses, and that early individual differences can be viewed in terms of differences in this motive. It will be the purpose of this paper to argue in favor of a motivational theory as an explanation of early differences in cognitive development with the understanding that the effects of non-learned differences and their interaction are appreciated.

Theorists considering the mother-child interaction have recently given much attention to the nature of the maternal response to the infant's behavior as the basis for the infant's cognitive growth (Hunt, 1960, 1961, 1963; Provence & Lipton, 1962; Provence, 1965; Watson, 1967). These theorists have argued that at least two dimensions of the mother's response are important in affecting the infant's cognitive development. One is the total amount of stimulation provided the infant by the mother (Hunt, 1963), while the other is the contingency between the infant's behavior and the mother's response (Watson, 1967; Provence, 1965).

It is to the latter dimension that we shall direct our attention. While recognizing the importance of the quantity of stimulation provided the infant, it is the relationship between the infant's response and its outcome that is of primary concern. In this interaction an important motivational principle is established, namely, the infant's belief or expectation that his behavior has consequence in affecting his environment.

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[1] An expanded version of this article was published subsequent to this conference: Lewis, M., & Goldberg, S. Perceptual-cognitive development in infancy: A generalized expectancy model as a function of the mother-infant interaction. Merrill-Palmer Quarterly, 1969, 15, 81-100. This research was supported by the following grants: HD-00868, FR-00222, FR-05537 and 1 PO1 HD-01762.

The establishment or learning of this motive is the first question and while it cannot be empirically demonstrated, we believe that consistent reinforcement with short latencies (that is, before the memory trace of the infant's action is gone) is responsible. Let me present an example.

The infant experiences some uncomfortable somatic sensation (hunger, for example) to which he responds by crying. Assume that the mother, hearing the cry, goes to the infant, picks him up, and feeds him. If her behavior is consistent, it reinforces the event-action relation (namely, discomfort-cry) and develops within the infant a plan or expectation. It is difficult to imagine a perfect relationship where the mother always knows what to do and can always do it. Thus, the degree of her consistency will be an important variable, with greater consistency resulting in a stronger motive. The plan or expectation built by the infant is produced in this manner: uncomfortable sensation →action→cessation of sensation. In other words, his cry or behavior was effective in relieving his pain. How different this is from the experience of the infant who cries under the press of an uncomfortable somatic sensation and is not picked up and fed consistently or who cries and is not attended to because his mother, busy with other children, cannot reach him until several minutes after the onset of crying, when he can no longer remember the event-action relationship.[2] Or from the experience of the institutionalized infant who, because of the institution's schedule, cannot be held when he wants to be and is held when he does not want to be. Although the latter infant may receive as much stimulation as the former, these are non-contingent on his action and accordingly, the principle of affecting his environment by his action is not learned well or its acquisition is delayed.

It is interesting to note in passing that psychiatric theory also is involved in this motivational notion. Adler's concept of striving for superiority (see Ansbacher and Ansbacher, 1956) can be viewed as man's struggle to become more effective in controlling his personal world, and R. W. White's notion of competence (1959) is clearly relevant to this discussion.

In general form, what we have been hypothesizing is that quantity and timing of maternal response to the infant's behavior, and the degree of consistency of her responses have important motivational qualities, developing and reinforcing the infant's belief that his behavior can affect the environment.

At this point, I would like to present some data to support these hypotheses. Provence and Lipton (1962) in their study of institutionalized infants provide information to support this motivational view. They showed that institutionalized infants differed from home-reared infants not in *whether* they exhibited a skill or *when* they reached a developmental stage, but whether they *utilized* the skill. For example, their data indicated that the institutionalized infant stood up in his crib at about the same age as the home-reared infant. That is, the maturational sequence was unfolding at the same rate for each of the groups, but the institutionalized infants showed no desire to practice the skill. It appeared to Provence and Lipton that these infants were not motivated to stand. Thus, it was the motive rather than the skill or structure that differentiated these groups. *It was not how much of the skill or structure that was important in differentiating the infants, rather it was the motivation to use the skill.* We suggest that the basic quality of that lack of action was the infants' belief that their behavior could not affect their environment. With such a belief, it was little wonder that they gave up.

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[2] The case of the infant crying because he was hungry may represent a more interesting example than we initially imagined. Because his crying and hunger probably remained constant over a relatively long period of time, it is possible that when the mother finally responded, she could still help development of the infant's contingency awareness. That is, as long as the original source of the cry and the cry itself remain present, it might be possible to link event and action. This is a particularly important point, for unless this were possible, most event-action pairing would not take place, owing to the long latencies usually found in the infant's natural environment.

Most recently, Maier, Seligman and Solomon (in press), in experimenting with classical and instrumental conditioning paradigms, have come upon a phenomenon in the failure to learn which they have labeled helplessness. In their experimental paradigm, dogs first experienced unavoidable shock in a classical conditioning situation where shock was the conditioned stimulus. After experiencing this situation, the animals were placed in an instrumental avoidance situation in which they had to learn to avoid shock by going from one area in a shuttle box to another. Maier *et al.* found that after a minimum of unavoidable shock experiences, the animals, in general, were unable to learn the instrumental behavior (leaving the area of the box) to avoid or even escape the shock. In searching for a reason for the failure of these animals to learn, Maier *et al.* argue that the most parsimonious explanation involves the notion that the animals acquire expectations about the outcome of their acts. They postulate that in the classical conditioning situation, where shock is unavoidable, the animal learns that shock or rather the cessation of shock is independent of any response he makes. That is, Maier *et al.* assume the animal produces many different behaviors, some of which sometimes accidently work (the shock goes off) and then do not. Thus, not only is no behavior effective, but even more important, the contingency between his action and outcome is zero. The animal has learned in the classical conditioning paradigm that no behavior he can produce will affect the shock. He then generalizes this belief to other situations, and so he sits in one compartment of the shuttle box and neither escapes nor avoids; that is, he sits there and "takes" the shock. Those of you who are aware of the level of intensity of shock used in these experiments will appreciate what it means that an animal comes to submit to such an experience, having learned through non-contingency training that "nothing I do matters." Note that this phenomenon occurs only when unavoidable shock in a classical conditioning situation precedes the instrumental conditioning situation. It is clear that this learned motivational principle of helplessness is extremely important in determining the cause of subsequent behavior such as cognitive development or learning.

In our own laboratory, six-month-old infants exhibit significant differences in attention to a wide variety of visual and auditory stimuli. In order to observe whether the mother-infant interaction was related to these differences, a variety of maternal and infant variables were rated for each infant seen. The results suggested an important and intimate relationship between the mother-infant interaction and attentional differences. Indications were that the infant who was handled and addressed often was more responsive to his mother and other adults and was less irritable. However, it appeared as if the amount of general and random stimulation level, as measured by the number of other siblings in the home, did not result in greater responsiveness on the part of the infant. Indeed, there was a negative relationship between number of siblings and responsiveness.

When infants were divided into high-and low-attenders on the basis of their fixation time to visual stimuli, several interesting contrasts emerged between high- and low-attenders in terms of the maternal behavior as rated by the observers. When one looked at the extreme cases, highly attentive subjects had mothers who enjoyed their infants, showed a great deal of physical contact, vocalized a great deal, were more protective and tended to anticipate their infants' needs.

These results compare with those of others (Katkovsky, Crandall & Good, 1967) working on the parental antecedents of older children's belief in internal and external control of reinforcement. Internal control of reinforcements means the child believes that his action can affect his environment. It was found that parental antecedents of general babying, protectiveness, affection and approval are all significantly correlated with the development of the child's belief that he can affect his environment.[3] Accordingly, our observations for mother-infant interaction were in agreement with studies using older children. In terms of our notion of contingency behavior and its relationship to the subject's belief in his ability to influence his environment, these results are highly provocative. This is especially true if we assume that attentive behaviors are in part reflective of the infant's motive to seek out his environment because he can manipulate it.

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[3] Without limits or over long periods of time such maternal behaviors as babying, protectiveness, approval, etc., may result in subjects developing an expectation that others will reinforce him; if so, what may be facilitating maternal behavior in infancy may be debilitating at a later time. Moreover, it appears that there are personality factors beside those of cognition which need to be dealt with.

Method

Because the available general rating techniques are limited in usefulness, an attempt was made to create a situation in which the experimenter might directly observe and record the mother-infant interaction. The choice was between observing the mother and infant in their home and bringing them into the laboratory for observation there. While each procedure has its advantages and disadvantages, we preferred to construct as controlled a situation as possible in order to observe individual differences in interaction. At the same time, however, it was necessary to create as natural a setting as possible in order to elicit realistic interaction. A controlled, naturalistic setting was decided upon. This was done in the following way.

One hour prior to testing, the mother and the infant were left alone in a room which was filled with an assortment of furniture, cribs and current popular magazines to read. The mother was informed that the equipment was warming up, given a cup of coffee if she wished, and was left alone. The baby was placed in a reclining infant seat in view of the mother. Finally, the magazines were pointed out and *E* left the room. These procedures were identical in every case and were designed to produce a controlled naturalistic setting. Two particular manipulations are to be noticed. One, the currentness of the magazines (and hopefully, their positive valence) was manipulated by changing the magazines regularly. This detail is an example of the attempt at controlled naturalistic observation. The second manipulation had to do with taking the baby from the mother. By doing this, we required each mother to make a discrete and measureable response in order to recover her infant, and we might, moreover, have made it easier for the mother not to interact with the infant if she so desired. In this way, an attempt was made to produce a wider distribution in the mother's response to the infant.

Every 10 seconds, an unseen observer recorded the occurrence of various behaviors; e.g., whether the mother looked at, smiled, vocalized, held or touched the infant. Also recorded was whether or not the infant's eyes were open or closed, whether he moved, cried or vocalized. Moreover, each time the infant exhibited one of these behaviors, the observer recorded the nature of the maternal response, if any, and its latency. High inter-observer reliability was obtained for these behaviors.

Because we were interested in the effect of the mother-infant interaction on cognitive development, each of these observed infants was placed in a situation designed to test cognitive capacity. Specifically, each infant was presented with four trials of a redundant visual signal. Previous data (Lewis, 1967) have supported the notion that rate of habituation to a redundant signal is a measure of cognitive capacity. We have presented evidence to indicate that habituation is directly related to IQ and inversely to errors on concept formation tasks. Moreover, it has been demonstrated that there is a direct relationship between habituation and age over the first three years, such that 3-month-old infants fail to show significant habituation to a repeated visual signal, while 44-month-olds show significant habituation.

The theoretical framework for this habituation has been discussed before; briefly, it is postulated that habituation is a measure of the rate of model acquisition with more rapid acquisition being related to higher cognitive capacity (Lewis, 1967). In the present study, the rate of habituation was correlated with the amount of maternal-infant interaction.

Results

Twenty 12-week-old infants were used in this experiment. The results indicated that for these infants, response decrement was correlated with the amount of touching the mother exhibited (rho = .45, $p<.05$), amount of looking (rho = .65, $p<.01$), amount of holding (rho = .38, $p<.08$) and amount of smiling (rho = .26). Amount of magazine reading was negatively correlated (rho = -.38, $p<.08$). These correlations indicate that the more stimulation the mother provided the infant, the greater was the decrement to the repeated signal.

In order to explore the contingency relation, the percentage of time the mother responded to the infant's crying and vocalizing was obtained. Crying and vocalizing were the only two responses that occurred with sufficient frequency to be analyzed in this fashion. Comparing these percentages to the amount of response decrement also revealed significant correlations (rho = .53, $p<.05$ for infant vocalization, and rho = .44, $p<.05$ for infant crying) such that the more times the mother responded to the infant's behavior, independent of the number of times the infant produced that behavior, the greater was the response decrement to the repeated signal. Cognitive development was enhanced as a function of mother-infant interaction.

Discussion

The data, both our own and those of others, seem consistent and strongly suggest that an important expectation is learned in early infancy, namely, the expectation that the infant's action can have a pay-off in its environment. Further, the data indicate that without this expectation, the organism's performance as well as subsequent maturational development can be seriously affected. Moreover, we believe that this expectation is learned through the early mother-infant interaction as a function of the contingencies of infant and maternal response sequence. But what might be the relation between this learned expectation and its effect on cognitive capacity? The answer seems to be multiple. First, the lack of this expectation should reduce the infant's exploration of his environment; that is, if he cannot affect change or outcome, why pay attention to it? This lack of interest should prevent the infant from exploring his environment and enriching his set of experiences, expectation and schemata. Second, the infant is unlikely to rehearse developing skills and structures as they unfold in their developmental sequences. Thus, new skills are lost and additive functions do not occur.

Before turning to discuss some further individual differences that may be functions of this motive, it is necessary to discuss some general points concerning the acquisition of the motive and its subsequent effects.

It is to be noted that this learned motive is an underlying principle upon which subsequent learning as well as maturational processes will be built. Further, this simple motive can be acquired quickly. The results of Maier *et al.* with animals support the notion that the acquisition of the motive can occur within a relatively few trials. If this is true, then this motive might be acquired in the opening weeks of life and might therefore appear to be a non-learned individual difference. That is, the fewer the trials to learning and the earlier a set of behaviors can be learned, the more complicated it is to differentiate learned and innate differences. While we believe that early learning is involved, it is also quite apparent that basic attentional differences could facilitate the recognition of the contingency relationship and thus, genetic differences might interact in the development of this motive.

Another important issue is the duration and strength of this motive. The data of Maier, *et al.* indicate not only that the motive is learned in a few trials, but that experiencing the unavoidable shock condition an additional time after the instrumental conditioning procedure renders the motive inextinguishable. The data indicate, therefore, that once well learned, the motive is not reversible.

Moreover, the number of trials does not seem to be the important variable, but rather the reinforcement relationship. Whether this is true for infant and human development is not clear. Also in question is the possibility that the acquisition of this motive may have a critical period.

One final point needs to be made. It is clear that all infants receive some degree of contingency experience. What we have been discussing is the belief that the quantity of contingency experience is instrumental in developing the strength of this motive. Institutionalized and psychotic infants represent only an extreme on this continuum.

Relation to Differences in Socioeconomic Status (SES) in Infancy

Of interest to this discussion are early individual differences, especially those related to socioeconomic level. It is easily demonstrated that this general motivational theory can be related to these differences. Working from Rotter's social learning theory (1954) and the notion of a generalized expectancy, many investigators have repeatedly explored the dimension of internality and externality in children (see Lefcourt, 1966, and Rotter, 1966, for two reviews of the problem.) The data for SES indicate that, in general, the lower SES group show less internality than the higher SES groups. That is, lower class children, often Negroes, demonstrate that they lack the belief that their actions can affect their environment (Franklin, 1963; Battle & Rotter, 1963; Lefcourt & Ladwig, 1965). Moreover, the finding that young children rather than older ones also show less internality (Crandall, Katkovsky & Crandall, 1965) suggests that deprived groups, in general, possess less of a belief that they can control their reinforcement. The data on internality also indicate that it is an important variable for predicting achievement behavior and learning, such that the firmer the belief that one's actions are effective in controlling reinforcement, the greater the achievement behavior and the better the learning (Crandall, *et al.*, 1965; Crandall, *et al.*, 1962; Seeman, 1963; Seeman & Evans, 1962).

We can use the SES differences in internality as a basis for discussing differences in cognitive development in young children, and it would be parsimonious to extend differences in this expectancy to individual and SES differences in infancy. Moreover, data from infants and animals support the effect of differences in this expectancy. It is our intention to hypothesize just such an effect.

While recognizing that there are multiple factors, it is suggested that individual differences in infancy, and especially SES differences, can be accounted for in part by this motive. Lower SES infants believe themselves to be less powerful (in control of reinforcement) than higher SES infants. Moreover, it is hypothesized that this motive is imparted by the mother-infant contingency relationship. Low SES mothers are less likely to perform those behaviors necessary to develop this motive. Thus, this motive or its lack is developed during infancy in the contingency patterns and is probably extended through the social milieu when the child is older.

In the use of the word power, a sociological and political term is immediately invoked, and I feel it is no accident that a strong social movement has adopted this phrase. Black Power, Poor Power and Flower Power are all examples of the general feeling among groups using these terms that they have no effect on their environment. They feel impotent. On a sociological scale, they are stating the very expectation or motive we have tried to describe for the infant.

Given these possibilities, it may be necessary for us to affect the mother-infant interactions as well as the social milieu if we intend to remedy the feeling of impotence among lower SES groups. It becomes, therefore, increasingly clear that additional work describing in detail the mother-infant interaction contingencies and their consequences is necessary, and that such programs as Head Start belong at the start — in infancy.

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PHILIP H. SALAPATEK, PH.D.

I would like to offer some general and some specific comments about the previous papers.

It seems that during infancy, and indeed throughout development, we are faced with two basic theoretical concerns. The first involves explanation of the development of general perceptual-cognitive strategies, that is, the development of approaches of the infant to specific stimulus situations, which are relevant to his approach to all stimulus situations. This concern is reflected in investigations of the reflectivity-impulsivity dimension, by research on conditioned helplessness, and by concepts such as contingency feedback. Some constructs which are central to this concern are the abilities and strategies involved in the selection of relevant cues from complex inputs, the rate and scope of such selection, and the maintenance of focal attention upon specific cues with a continued peripheral vigilance for new or relevant stimulus events, e.g., peripheral stimulus appearances, disappearances, or changes.

A second developmental concern is that of explaining specific acquisitions and behavioral emergencies; for example, the acquisition or emergence of schemata, such as the schema for a face. Specific competencies of this variety are undoubtedly dependent upon general perceptual-cognitive competency, and both general and specific competencies are variously affected by or dependent upon genetic and experiential factors which find their expression in terms of age, social class, sex, and individual differences in competency.

Jerome Kagan mentioned that possibly important for the specific acquisition of a face schema, or recognition of the mother, is the distinctiveness of an input. I would like to suggest that distinctiveness of an input may be a function of both the infant's developmental level of general processing strategies, and the noise level of the environment around him. For example, some children might be better selectors of relevant patterns or inputs from their environment, given that there exists a great deal of peripheral distraction.

Kagan also suggested that middle class children show more cardiac deceleration to a face early in life because there may be more face-to-face play between mother and child in the middle classes. On the other hand, it is possible that in the lower classes the infant is exposed to more faces, or a modality overload; that is to say, it is possible he has a noisier environment in terms of distracting stimuli. It is also possible—and this is not improbable—that the types of faces that are viewed at this particular age in lower classes are the faces of young children rather than parents, in which case inappropriate specific learnings rather than overloaded general strategies may explain the differences obtained. It is not clear what relevance initial repeated exposure to children's faces would have for the recognition of grownup faces such as were used in this study, but one might want to try this study with faces of different ages.

It is also of importance to consider whether the response to faces in Kagan's study is one that is based on a general face schema—that is, not dependent upon recognition of a specific face—or whether it is one that is truly dependent upon recognition of an adult face and particularly one that is most similar to the mother. Certainly his infants were very young to be displaying recognition of specific faces.

Kagan also reported that girls appear to be developmentally more advanced than boys. One explanation offered for this finding was that girls may be born 'less variable' than boys. In this case, it is important to test whether or not early general processing strategies are more consistently patterned in girls than in boys. I shall later expand upon this point. Another explanation offered for the foregoing sex difference was that mothers from different social classes may behave more similarly toward sons that toward daughters. This interpretation presented me with some difficulty because it appears to lead to the opposite prediction, i.e., if sons received more consistent input, then one might expect to find less variable behavior in boys than in girls. It was the lack of variability in girls that was supposed to explain the more organized response.

One finding of Gerald Stechler's that was surprising to me was the discovery that when an infant is attentively responding to a visual stimulus he is more responsive to a blast of air delivered to his stomach, i.e., to a stimulus delivered in a modality different from the modality initially supporting attention. Many investigators have described in adults an opposite mechanism, at least in vision, which has been termed 'tunnelling' and is operationally defined as a narrowing of the effective peripheral visual field when a stimulus of interest is centrally attended. This phenomenon leads one to expect less reactivity to peripheral stimulation when concentration is directed toward a single stimulus. It is possible that Stechler's results indicate that greater responsiveness occurs only when the second stimulus is delivered in a second modality; or is it the case that if one presented a peripheral *visual* stimulus, the infant would also show heightened reactivity? Or, finally, is it possible that effective tunnelling does not occur until later in life?

Over the past several years I have collected some data which are informative both with respect to the general-specific competency dichotomy and with respect to the comments I have made concerning the papers we have heard.

William Kessen and I have collected data at birth indicating that the majority of newborn infants fixate only a single feature of closed, visual figures, e.g., a triangle, for a considerable period of time. Of interest here is our more recent finding that newborn infants do not necessarily select the same feature, nor do a small subset of infants limit fixation to the same portion or amount of a given form. While collecting data for a larger study, it was possible to observe five newborn infants repeatedly for as long as nine or ten minutes a day on as many as each of four days of early life. We noted their visual reaction to a large eight-inch triangle positioned approximately nine inches from their eyes. We recorded in detail the visual scanning of the infants as they viewed the triangle. In all, we secured approximately seven dataplots of visual scanning for each infant, or approximately 35 dataplots for infants repeatedly observed. Each dataplot illustrated the infant's fixation points and eye movements over the triangle for 100 consecutive seconds of viewing. The unlabeled dataplots were shuffled, spread out in a room, and several of my colleagues were asked to sort them into logical piles. There was very high agreement among different sorters in the sortings obtained.

The data may be detailed as follows: Two infants focused on only part of the figure and scanned this part attentively for as long as nine minutes within a given day. Both selected an angle of the figure, looked at it very attentively for as long as 600 consecutive seconds on the first day, and approached the figure in exactly the same fashion for two consecutive days. Two other infants did not limit themselves to an angle, but concentrated variably on both angles and sides, continuing with this global form of inspection for as long as nine minutes a day and for as many as four days. The fifth newborn inspected the figure in a very sporadic, poorly directed fashion.

There was a clear attentive response to the figure by all infants. The scanning that was exhibited was very different in dispersion from the scanning one observes when a newborn infant views an unpatterned field. It is evident, however, that the visual inputs that the three infants were obtaining from the same visual form were very different. It is not completely clear what these differences mean at present. We do not know, for example, whether there exists any permanent storage in the newborn of specific visual input. We do see, however, that during the first week of life these individual differences are clearly present without previous visual experience and that they are very stable during the first few days following birth. One is tempted to guess that they may influence the development of later specific pattern and form perception.

These data are relevant to the previous papers. It is plausible to hypothesize that an infant who displays the general strategy of actively scanning a large portion of a figure will learn more about the total figure, and more quickly, than an infant who limits himself only to a single aspect of it. One might expect more rapid development of a specific schema, such as a face, in an infant who can and typically does extract information from many parts of the face than from an infant who limits himself to only limited aspects of the face.

It is as yet undetermined whether there is any specific pattern storage as early as the first or second week of life. Nobody has demonstrated habituation to specific visual patterns or figures at this age. But what *may* be possible is storage of visual input without any early, concurrent, behavioral indication of such storage; for example, an Uttleyan or Hebbian conditional probability registration of the sequential visual inputs. That is, there may be registration of the sequential patterning of inputs that an infant receives from specific displays by means of his consistent, highly patterned, very persistent visual response to the same visual form. At the very least, with even a primitive memory, it seems reasonable to hypothesize that relationships between elements comprising a visual pattern are being registered as a consequence of consistently patterned scanning even if the actual sequencing of input proves unimportant.

The five newborn infants described are too few to indicate whether these data are sex-related. In general, we have not found the sex difference that Stechler has found in his data. In randomly selecting 78 babies for a similar study on vision, on the basis of awakeness when confronted with a figure, we happened to get a 39-39 sex split. Certainly, however, the finding of sex differences in the visual strategies described would be most relevant to Kagan's reported sex differences.

We do not know whether or not stable individual differences in the visual inspection of form continue for weeks or months after birth. Also as yet unexplored are the various abilities and strategies that may be particularly important for general perceptual-cognitive competency, and the timing of such capacities. Many investigators of the development of form and pattern perception have been concerned only with the development of specific schemata, and most investigators have used differential "fixation" as the measure of form selection, preference, or discrimination. Fixation of a stimulus, with very few exceptions, has been operationally defined as visual orientation towards the general region of a particular patterned input, and consideration has been given to number of fixations, or length of a fixation, or duration of first fixation, or number of alternations of fixation. There has been, however, no accurate recording or consideration of what a fixation is. For adults, a fixation is a very brief information gathering response aimed at a focal region in the visual field. Usually, at the end of that time, some decision is made as to what the next input is going to be.

The decision as to the next input or locus of fixation for an adult typically is made on the basis of what else is present and where it is located in the visual field. The next fixation point is also influenced by decisions previously made (set) as to the selection sequence to be followed for close inspection of items present and not present in the visual field. For the young infant, the next eye movement and fixation point are probably less determined by any memory-based set than by on-going visual stimulation. The next fixation will probably, therefore, be made generally on the basis of visual reflex capabilities and on the basis of what we might term visual peripheral processing.

Peripheral processing would first include general sensitivity to figural elements that are present in the periphery of the visual field. Other aspects of peripheral processing would include hierarchical probabilities of response to peripheral offsets, to onsets, and to the temporal sequencing of peripheral stimuli. Critical to efficient peripheral processing is the ability to inhibit an eye movement. Certainly peripheral processing implies holding the eye in one place and deciding which stimulus will be next centrally viewed rather than moving immediately and directly to any peripheral stimulus. Infants with this ability should be able to select a sequence of items for intensive inspection from an unvarying visual field, and to note any informational change that is introduced into their peripheral visual field, without necessarily immediately and automatically directly fixating this change.

It appears to me that a closer inspection of the development of general processing strategies and of the experiential and fixed properties of such systems within all sensory modalities might well be crucial for the full understanding of such variation in specific competencies or acquisitions as described in the papers we have heard.

ARNOLD SAMEROFF, PH.D.

People not working in the area of infant research do not fully appreciate the rapid advances made in recent years, especially by the individuals who have presented papers on this panel. One of the major reasons that research lagged in this area prior to this time was the lack of appropriate measures of response to reflect the experiential world of the infant. The response measure serves as a communication link between the subject and the experimenter. With adults this communication is relatively easy since both experimenter and experimentee share a verbal system of communication. With animals of a lower order it is a little more difficult, but through suitable manipulation of the environment a system for communication can be designed; for example, turning left in a maze is a reaction to one kind of situation while turning right is a reaction to another.

With young infants, especially newborns, neither the linguistic nor the motor system is sufficiently differentiated to be of much use as a response. Given the problem, the investigators who have reported here today have proved their ingenuity in devising ways to get around these problems of communication.

Once the problem of communication has been solved—that is, a response of the infant is found that will reliably reflect his reaction to a change in the environment—the next question the investigator must apply himself to is: Which of the multitude of possible changes in the environment would be meaningful to evaluate? This problem can be paraphrased: What are the important dimensions of the environment for the infant? And secondarily, how do these develop? We self-reflective, abstractly-thinking adults dimensionalize the environment in a number of ways: perceptually, cognitively, and emotionally. These adult dimensions have been conditioned by a long history of association with the world in which we live.

In the infant who has not had this long association with his environment can we assume that the bases for dimensionalization are the same as for the adult? Adultomorphizing may be a great error in this situation. For example, we are not sure whether something as simple as shape is a valid dimension for the infant. Stimulus intensity would seem to be a dimension sufficiently primitive so that even an infant would respond to it. A more articulated statement cannot be made on the basis of research to date.

It may be that Freud was correct in his hypothesis of a pleasure principle preceding the reality principle in development. The world of the infant may be strictly affectively organized, with a nipple and the face of one's mother being equated. Although perceptually and cognitively the adult recognizes the two as being quite different, the infant might equate them owing to a positive feeling they both give rise to.

After this organization of the environment is understood, the next question must be: How does this organization change as the child develops? What may begin as affectively differentiated inputs are converted to the objective dimensions of external reality. Building on the foundation of biologically conditioned systems the child differentiates form, color, sound, etc., into dimensions and systems organized by his physical and social experience with the environment.

Each of the environmental stimuli retains a place in the two systems, the cognitive and the affective, even though the position may change. Kagan has given some evidence for the change in the difference or contrast between the young infant who fixates stimuli as a function of their visual interest value and the eight-month-old who relates to the stimulus through a developing nest of associations coordinated with the immediate perception.

In my own research, using newborns and a different response, sucking, I found that there were a number of changes to which the newborn infant was insensitive, whereas the response, when he did respond, had an affective character. He would increase the amount of sucking in association with a change in stimulation; this can be hypothetically related to arousal. When older infants are presented with a similar situation there is a change in the nature of the response. From two months of age on there is a growing ability to inhibit the sucking response and orient to the stimulus change. The infant comes to be able to break away from his physiology and makes a beginning at intentionality. So again, an affectively organized response seems to change to a more cognitive organization. Certainly this question could stand more investigation.

A longitudinal study of a few months is relatively easy to mount; but one which can assess the effects of differential environments and heredity would run far longer than the two-and-a-half years that René Dubos had difficulty in devoting to his rats. Moreover, a study which would then investigate differential mothering effects as a function of the mother's developmental history would add yet another generation to the study. I raise this point to indicate that even with the intensive investigation of human behavior, it will be a very long time before we have a full understanding of the effects of our manipulations. Humans generally are born with an average expectable endowment into an average expectable environment. What differences in development will be caused by differences in environment is a question for the answering of which we have very little data. We have some knowledge of extremes through natural experiments, such as institutionalized children or children born to schizophrenic parents. One might put these two examples on opposite extremes of a stimulus dimension, not one of simple intensity but rather related to the amount of information in the environment, or what Michael Lewis has discussed in terms of predictibility.

In the case of the institutional child there is little if any information, little uncertainty, and relatively little to predict; that is, nothing changes. On the other hand, there are other children in such bizarre environments that they can never discover the contingencies because there aren't any. There is an overload of information and of uncertainty in this latter situation. This overload might typify the child growing up with a schizophrenic mother. Information is another dimension, then, which seems to have meaning in the relationship between infant and environment, especially between infant and mother. This point has been well made in Gerald Stechler's presentation.

As a society we have now begun to make major manipulations in the upbringing of young children. America is not alone in this and Project Headstart is only following in the footsteps of programs that Eastern European nations have been using for years. That others are involved in similar projects does not justify the procedure. The lack of adequate time to assess these programs even in their short range effects has not given us much information as to their benefits.

Let me spend a short minute developing a possible model for the effects of enriching the environment of children in the preschool years. Given a child in a depressed, deprived, inner city environment, the effects of such a program can be beneficial in providing the social structuring which will allow the child to understand and relate to his environment. However, given a child who grows up in an average expectable environment of middle class parents with adequate social structuring, is it possible that enriching this environment can produce over-structuring, over-definition of the environment? An important question is: By this overstructuralization and possible premature abstract understanding of his environment is it possible that the child is being deprived or constricted in the experience of the richness and variety of his environment both cognitive and affective? This question cannot be answered until the adult products of such an environment can be evaluated. Is it possible that the youth who we find in revolt today, the hippies, the drop-outs, are reacting to the over-determination in their lives, the over-directedness and over-structuralization? It would seem to me that we are not yet at the point where we can make the appropriate value judgments on differing rearing patterns and their effects.

One of the ways of making a beginning in this area is to find ways to assess infant personality so that we would know what we were starting with. Personality in infancy cannot be equated with constructs such as dependency and aggression, but rather with directly measurable variables such as physiological responsivity, movement patterns, and orientation patterns. For example, it has been clearly shown that babies differ in amount of movement. Some babies are decidedly, consistently more motile than others at birth. Motility can be regarded as a simple-minded equivalent of personality. However, when related to the personality of the principal caretaker, the mother, it takes on a broader significance. An active baby paired with a mother who is expecting an active baby, and likes active babies, makes a fit. On the other hand, if an active baby is paired with a mother who would like a quiet baby and who feels less willing to deal with an active baby, an element of tension is added to the relationship. One can see from this that although motility is not what one typically thinks of as a personality variable it can be related in a meaningful way to the developmental outcome of a particular child.

Jerome Kagan's interesting data concerning babies who initially smile consistently less than other babies presents another interesting variable which can be viewed in the same way. Jacob Gewirtz suggested at one time that it would be a good procedure to condition institutionalized infants to smile more. More smiling would elicit more attention from the caretaker who will provide a better environment for the child. In the same way a baby that smiles more will elicit more positive responses from his parents and probably have a different kind of relation than a child who congenitally smiles at a much lower rate. What the end results of such interactions will be has not yet been investigated.

These areas of research where we do not know the answers, but we are making some strides toward discovering the questions.

DISCUSSION

DR. WILL BETH STEPHENS (moderator): Let us ask Dr. Kagan to respond to the two questions that were raised by Dr. Salapatek.

The first one is: May we not need to contrast maternal face-to-face play in upper classes with contact with many other, younger perhaps, faces and more noise in lower class homes which might lead to confusion?

And the second question is: Is the early face schema general or specific?

KAGAN: We have been concerned about this first question. Accordingly, all our subjects are first-born. There are, therefore, no siblings in the situation. Moreover, they are not slum children; all of them are living in apartments. There is no excess of people peering at these children.

As to the second question, I think this really does represent a distinctive schema for a face. Additional data come from the fact that when you expose to these infants stimuli that are not facial — for example, random forms — there are no class differences. In another study Howard Moss showed that when infants were shown a checkerboard, there was no relationship between face-to-face contact and fixation time to the checkerboard. I would say, therefore, this is very specific. It is looking at a *face*.

STEPHENS: Dr. Stechler, does heightened receptivity occur within a single modality or just across modalities when the infant is attending to stimulus, or does funnelling develop with age?

STECHLER: When we launched this particular study, which was to stimulate a baby with a light air puff to the abdomen while he was looking at a patterned target or at a blank field, we were able on the basis of long clinical and other experimental observations to predict without any trouble that the baby would quiet — that is, his motor activity would diminish — while he was focused on a patterned target. This was easily demonstrable through recording the gyrations of an air mattress.

As to whether the infant would hyporeact or hyperreact to a new incoming stimulus we did not have any *a priori* notion, because different neural models predict different responses.

If we can allow this as being a novel stimulus coming in to the baby, we can expect activations of certain non-sensory arousal mechanisms which jazz up the organism, and lead towards the prediction of hyper-reaction.

As you know, there are also selective attention-suppressive factors which operate when someone is concentrating on some aspect of the environment. I think the matter here may well have to do with the strength of the stimulus. That is, that while selective attention is going on, if that is what is happening with a newborn baby, the threshold may well be raised to new incoming stimuli; but this does not mitigate against the possibility that if you exceed those thresholds, you may get a hyper-reaction.

It's as if you are concentrating on a mathematical problem or are heavily involved in something and somebody rustles a paper offside. You may not hear that at all. But if a truck backfires, you may well hyperreact, whereas you would not if you were just lazily gazing at the ceiling.

The ultimate test of this is to run up and down thresholds, but that is so awfully difficult with babies, because their responses are so unreliable. As you get down to threshold, responses and threshold merge into total unreliability.

QUESTION: In any of the infant fixation studies has the mother's face been presented to the child scrambled and non-scrambled and compared to pictures of other faces or masks?

KAGAN: Yes. In a study on six-month-old children, we got trends in the right direction. Nothing very dramatic. We showed Kodachrome photographs of the mother's face imbedded in strange female faces. At six months of age there was a slight tendency to show differential fixation. Several years ago Banks, I believe, found larger cardiac decelerations to the mother's face at four months than to the strange female face. I think this is what we would expect — that the child does have a schema for the mother's face before he is six months old.

LEWIS: Some work done in the auditory modality using the mother's voice, a strange female voice and a male voice shows that the 24-week-old infant in general displays greater deceleration to the mother's voice, and that this is more true for girl infants than for boy infants.

QUESTION: In analyzing the face-to-face contact of parents with child, have you examined the intra-class relationships; for example, between those upper class parents who do less of this and those lower class parents who do more of this within their social classes? One of the difficulties of SES type studies is that they tend to result in attribution of one characteristic to one social class and another to another.

KAGAN: But these are intra-class differences.

HOWARD MOSS: Right. But I think there is another point which may clarify these findings a bit more. There were no differences between the *amount* of face-to-face contact for boys and girls at two ages at which we studied these, one month and three months, but the *relationship* showed up there. You really could not account for this phenomenon on the basis of the frequency of contact but —

KAGAN: But the girls who got more such contact looked more, and the girls who got less looked less.

MOSS: When you compared boys' and girls' means, there were no differences.

KAGAN: This is so common. In collection of data at any age, you find often that the means and SD's are the same for boys and girls. Don't be fooled. The patterns of relationships are always different.

STECHLER: Some years ago Judith Rubinstein carried out a study in which social class was held constant. Her subjects were five-month-old infants coming to a Well Baby Clinic in Brooklyn, pretty much of the same lower middle social class. She made repeated three-hour observations in the homes of the amount of attentive time spent by the mothers directed toward the child. She found a wide range, as you might expect: from 20 percent to close to 90 percent for a three-hour observation.

At six months of age these children were tested on a small battery of tests having to do with exploratory behavior, such as how actively and with what variety they would explore, and also how much they preferred novel stimuli over familiar stimuli. The last is a very powerful phenomenon in infancy.

Correlations were quite strong which indicated that the extent of exploration of a single target, the variety and length of time of exploration and the preference for the novel stimulus were greater in those children whose mothers had been more attentive. Moreover, in some of the children from homes of low attentiveness the familiar/novel preference was reversed, the children preferring the stimulus to which they had already become familiarized.

ZELLA LURIA: I am concerned that in what we have heard today there runs a kind of psychological determinism. I would like to give the speakers a chance to undo this feeling that what has happened in the first few hours or months cannot be undone again.

KAGAN: As a matter of fact, we know the human infant to be very plastic and malleable. I think that the implications of today's discussion are that we now have opportunities to effect change very early. I would favor, incidently, educating the mother into practices that we think are theoretically reasonable. I favor that strongly over the creation of schools or institutions to which she brings the child — for two reasons:

First, because it will be a lot more efficient to let the mothers do it.

But second, the mother must feel responsible for the psychological growth of her child. It is all too easy for her to project that responsibility onto agents over whom she has no control.

And I think I favor strongly also the initiation of experiments in which we would demonstrate that one can educate parents of any social class to effect certain procedures which change the psychological growth of their infants.

LURIA: Face-to-face contact stays at the same level for the boy as the girl. All the evidence seems to indicate the mother can't control the boy's responses as well as she can the girl's. May not the mother's behavior at some point become programmed by the boy's relative lack of responsiveness?

MOSS: We have some additional data which I think bear on that. At one month of age responsiveness was significantly related to the amount of face-to-face contact for both males and females. At three months, however, this correlation had become enhanced for girls, whereas it had become not significant for boys. Evidently, other factors contributed to this face-to-face interaction at three months.

Further, we rated the amount of concern and apprehensive fears over their infants' well-being that mothers showed, and we related these ratings to the amount of face-to-face contact. At three months the correlation coefficient between anxiety rating and face-to-face between mothers and boys was in the '50's, but no relationship was found for girls at three months.

Some attributes of the infant determine or contribute to this maternal behavior. Boys show more protest behavior; this could perhaps be a factor.

KAGAN: Let me add two things, and see if we agree.

A number of us find that the mothers of sons, when invoved in face-to-face stimulation, are much more likely to handle their sons, providing kinesthetic and tactile input, than they are with their daughters. If the son starts attending to the tactile, kinesthetic input, he will be perhaps distracted from face-to-face input. The situation, therefore, will be less distinctive. He has other input messages to attend to. That's one possibility.

Secondly, to pick up Dr. Luria's point, we have felt that when an infant girl is in this happy state of face-to-face contact with the mother, she is much more apt to babble back than the boy, especially in the first six months. The boy is apt to give a motor feedback.

Now, if the mother feels she had gotten greater payment through babbling, then she is apt to maintain this situation.

Can you support these possibilities with data? (to Dr. Moss)

MOSS: We haven't analyzed our data for that particular contingency, but we do find that the frequency of maternal imitation of the infant's response is higher with girls.

FRANK GARFUNKEL: I would like to return to the question about social class to ask again what difference does social class make? Some critical phenomena such as the amount of contacts that mothers have with children cross social classes. It is not really social class that we are interested in, but the phenomenon itself.

KAGAN: I agree that social class is not an explanatory variable. There are two approaches in this area. I am not sure which is the best.

In trying to understand the statistically predictable cognitive deficit of the four-year-old lower class child, for example, one approach is to say, "I have a good theory. Now I am going to study an undifferentiated group of mothers and infants for the appropriate responses." But we don't have a good theory. We must, therefore, in a preliminary attempt, go into the criterion groups that we know will be different at the age of four years, with full realization that class criteria are not explanatory variables. This is an inductive phase of the work. We ask, "How do these mother-child interactions present differing patterns of variables?" If it turns out, then, that lower middle class mothers *do* spend less time in face-to-face contact with their girls, we begin to discover the psychological variables that might mediate observed class differences. It is a perfectly reasonable approach.

Once we have a theory of cognitive growth, we will select mothers on the theoretically relevant variable.

GARFUNKEL: But among different lower social class groups, particularly now, in Roxbury and in Mississippi and elsewhere, we suddenly find whole new constellations of events taking place which will modify class structure and behavior. Unless we identify these and admit subclasses, very carefully defining what we are thinking about, we are likely to get into a jam.

KAGAN: I specified our sample clearly as white Caucasian, lower middle class, unskilled laborers, living in Cambridge, Massachusetts. I'm not generalizing to Harlem or to the Hough District of Cleveland. Nor has anyone said that because these infants are different, there is something irreversible. As a matter of fact, I think there is an optimistic note in all this. If, in fact, these infants are beginning to deviate early, the knowledge that the baby is so plastic may easily lead us to conclude that what develops under unfavorable conditions is not an irreparable retardation.

QUESTION: There are two bits of relevant information about premature babies and their mothers that I would like to comment upon.

Into the sterile environment of premature babies was introduced the simple matter of rocking the bed of the premature baby for half-an-hour twice a day. A greatly increased smiling response occurred in those babies that were rocked. The difference has been seen in identical twins. Further, the observation has been made that the mother who is allowed to be in contact with her premature baby early presents a different type of mothering behavior later on than the mother who has no contact with the infant until after one or two months of the baby's life.

I wonder if the panel could comment upon the prevalence in various socioeconomic groups of sensory stimulation comparable to that of rocking, or whether in the different socioeconomic groups differences set up by hospital administration or by cultural patterns could lead to separation of mother from baby or from mothering duties, with effects comparable to what may be true for premature infants.

STECHLER: This opens a vary wide issue. A number of studies now suggest that the demonstrable slowness of early development in premature children is only in part due to the fact that they are smaller and less well developed at birth, but may be in larger part due to the fact that they spent the first four to six weeks of their lives under conditions which we would call stimulus deprivation in animal experiments, and under which we would expect fairly disastrous results. I think we will soon see a major change in hospital management of the newborn and premature. It has already been found that weight gain improves and infection and other unpleasant things are not increased by early handling of prematures.

It was suggested that the birth histories of people from different social classes are really quite radically different in this country. Before we come too heated up about early environmental factors, we must take a very close look at how babies come into this world, and whether differences in hospitals, in obstetric and nursery practices, in nutritional status or likelihood of infection during pregnancy, and in a host of other areas may make babies from different social classes quite different from one another, on a probabilistic basis, from the moment they are born.

PART II: PHYSICAL AND CHEMICAL GROWTH AND DEVELOPMENT

Papers by

Stanley M. Garn, Ph.D., Center for Human Growth and Development, University of Michigan
Donald B. Cheek, M.D., Department of Pediatrics, John Hopkins Hospital
Samuel J. Fomon, M.D., Department of Pediatrics, University of Iowa
Josef Brožek, Ph.D., Lehigh University

Respondent

Frank Falkner, M.D., M.R.C.P., National Institute of Child Health & Human Development

Stanley Garn reviews a number of aspects of growth and development, touching on undernutrition and overnutrition, on minerals, on chromosomal influences, and on protein malnutrition.

Donald Cheek calls attention to a new dimension of growth, the relationships that differences in cell size and number have to increments in body size. He relates changes in cell number and size to nutrition and to hormones.

Samuel Fomon emphasizes that disturbances of growth of nutritional origin in infancy may have lifelong impact. He also points out dangers in inferring quality of growth from quantity.

Josef Brožek points out some of the difficulties in arriving at workable criteria of nutritional status when there is so much to give attention to beyond anthropometric data, such as food intake, genetics, social, climatic and medical and cultural aspects of any given community.

ASPECTS OF GROWTH AND DEVELOPMENT Stanley M. Garn, Ph.D.

1.

We shall soon celebrate the 200th anniversary of the first modern growth investigation. It was a small study; in fact it involved but a single child. It was modest, being concerned with but one linear body measurement. But it was modern, in the modern sense of having a problem, and it was conducted over a sufficient period of years to yield the intended results.

Since 1777 we have learned a great deal, in a rough descriptive way, about the outer growth of the human body, its inner tissue constituents, and the chemical growth of the body mass. We have come to learn how much growth can be delayed by malnutrition, or speeded — by over-nutrition. We have come to know the asymptotes, or interfaces, in growth, that mark completion of one phase, and initiation of another phase. We have now outgrown some of the limitations of the study of exclusively "normal" human growth, adding natural experiments and needed medical intervention to learn why growth occurs or fails to occur.

These experiences, repeated in hundreds of different ways, have taught us what to look for, how to go about it, and the excessive cost of saving money in the course of growth research. We know the need of a people population, no less important than a rat colony, simply to see what happens as the child turns into a man, or as vigorous early adulthood moves into older age. For growth is a continuing process — as we have only lately learned. Limb bones, hand bones, ribs and skull continue to grow through the oldest of old age, and in their continuing growth and architectural remodeling lie the keys to the arthritic and osteoporotic bone disorders of advancing years.[1]

2.

The interaction between nutrition and growth is a now obvious one. If the caloric intake is too little, growth is impaired and with it, the capacity to resist disease. In too much of the world, and in too large a fraction of our own American population, not only is growth stunted by malnutrition but even minor diseases become major ones, further stunting growth (in those who survive) and killing far too many. But for perhaps two-thirds of Americans and Canadians, and West Germans and Englishmen, the food intake (from childhood on) is too high, leading to disorders of metabolism that ultimately kill.

The practical problem is how to assure enough but not too much food, relative to the energy expenditure, to assure growth in freedom from disease, yet without over-nutrition and its long-term consequences. Now and for the foreseeable future, many of us have to be simultaneous authorities on malnutrition and on obesity, both. The working problem is not so much that of agricultural technology and food distribution or of education and awareness, but the operational necessity of defining the limits of obesity at each successive stage of life.

3.

Together with nutrition, in the sense of calories and nutrients or the different kinds of undernutrition (and the different patterns of over-nutrition), we are now learning about the genetic and chromosomal regulators of growth, size and developmental timing. Some genetic advances qualify as break-through advances in the popular press sense. Small size may be due to genetically determined failures of growth-hormone activity, inabilities to utilize or metabolize particular amino acids, or genetically-determined antibody destruction of hormones involved in normal growth. Next breakthrough steps should show how target organs (like bones) fail to respond normally, in some boys and girls, or how the Twiggys are produced in the complex relationships between gene and enzyme and substrate.

There are some of us, possibly as many as 1 in 100, who are not simply males with an X and a Y chromosome (XY) or females with two X chromosomes (XX). Some have one too few chromosomes (viz. the XO) or too many chromosomes, like the XXY, or are so complicated chromosomally as the XXXXY. All such have growth abnormalities, are frequently developmentally defective and often intellectually defective. Even more to the point, the *proportion* of normal and abnormal chromosomal complements (for the sex) appears to be a major present and future step to study. Each of us is a Consensus, chromosomally speaking, as in the Great Society; a statistical majority rather than neatly and tidily just one sex or the other. Knowing the actual chromosomal vote, as it were, instead of the simple majority (as we seem) may go far to understanding how each of us develops to what we are and will be.

Knowing, too, how much is controlled on those X and Y chromosomes, we have new insight into the differences between male and female and the similarities and differences within families, too. For genes on the X chromosome, fathers and their sons might be no relatives at all, yet fathers and daughters are the closest of chromosomal relatives. It is in chromosomal genetics, here restricted to the X chromosomes alone, that present knowledge is gaining and the future sure to produce. We are in the midst of an exciting period of chromosomal labeling, what is on which chromosome and how it relates to growth.

4.

Developmental defects have a genetic basis, and a non-genetic basis, and all possible combinations of these and more. So, thalidomide-induced defects are due to the action of the drug at a crucial time, in particular genotypes, some rats being unaffected and other strains susceptible. Cleft-palate children often have but slightly affected parents or siblings, and in many a congenital or "birth" defect the interaction of a pair of factors can easily be shown. So, as the world progresses technologically we must increasingly identify the responsible causes of developmental defects — viruses, hormones, antibiotics, radiation — and the human genotypes most susceptible. Now all the world may share a virus formerly tribal in scope, and as the range of therapy increases so does the possibility of developmental defect from therapy gone wrong.

I have no compunctions about tinkering with Nature. After all, the sheer existence of human population density exceeding one man per square mile itself upsets the balance irrevocably. To feed four billion men we must of necessity kill insects, poison rodents, and hold back the weeds. To keep man alive we need the natural and man-made antibiotics, and to limit prenatal mortality we must repeatedly intervene.

But these long steps forward are also short steps backward. We have far more teratogenic agents, producers of developmental defects, in our world than in the time of our forefathers. We can save slightly defective or even markedly defective prematurely born babies, and we can create developmental defects by the agents used to prevent disease, to maintain life and to prevent miscarriage.

For a dozen unrelated reasons, therefore, we are going to see more developmental defects, if only for the once-lethal genes we now keep alive. We diagnose more, we save more, we create more. Evolutionarily, this is far from a problem; our net reproductive efficiency is many times in excess of what we need, and the species *sapiens* is hardly on its way out. But developmental defects will be increasingly with us. Unlike polio, a single group of diseases, the National Foundation will never run out of causes, soliciting for research on prenatal defects!

5.

Now, "growth" was once outside measurements, height and weight, size of head and the like. But inside the skin, growth involves tissues and the constituents of tissues. At one extreme, the circus fat lady may have five times as much fat as lean. In many of us, fat is one-fifth of the lean, or — at its least — not one-tenth. Unfortunately, no really accurate, simply employed methods exist for such estimates. We are still looking for the hardware that will easily and simply measure the amount of fat in the body at one day, one year, age ten and age one hundred.

Yet we know now that the composition of the human body is a major factor in growth performance — the fatter, the faster, up to some still unknown point. We know that the mineral mass of the human body rises, quite steadily, close to the 39th year and after this Jack Benny age, declines.[2] Many a seventy-year-old woman literally has a sub-teens mineral mass, and so reduced to a bony shell of her former self, is subject to vertebral collapse, fractures of the femoral neck, and fractured bones of the lower arm — at times even spontaneously. How much mineral mass is gained to age forty and how much lost thereafter becomes crucial and is now crucial to one-third of our populace, and to all over 50.

In the old way of looking at it, "senile osteoporosis" was a disorder of old women, hardly a subject for discussion in "Perspectives For Growth." But the girl is the mother of the woman, and how much bone she gains in adolescence is indeed crucial to how much she has left 40-50 years later. Bone gain, in turn, relates to mineral requirements for growth; hence to the Recommended Dietary Allowances (as set by the Food and Nutrition Board of the National Research Council) and — possibly — to Vitamin D fortification of milk and milk products. Adolescent bone gain, and the skeletal mass in adulthood, certainly relates to race, in which case it is better to be an American Negro than Scotch and Irish of ancestry. Bone loss relates to fluoride in the water, for at 3 ppm, bones as well as teeth appear to be protected. Obviously, mineral intake and particularly trace-element intake during adolescence in the female are subjects for major concern in the decades ahead.

6.

Apart from the mineral mass (located mostly in the skeleton) and currently in jeopardy in every woman over 39, major attention must be given — in both sexes and at all ages — to the fat mass and its developmental meaning. For we have come to change our attitudes towards fatness in the past thirty years. Once we viewed fat as "good," protective against infectious disease. We admired big bouncing babies and blooming, multiple-chinned infants. We are now against obesity on good statistical grounds, yet we really have no widely used, generally accepted measure of obesity nor (at any age level) a truly satisfactory definition of it.

The female is fatter at all age levels from before birth on, even though she is also absolutely smaller in most gross and refined dimensions. How do the chromosomes inform the fat cells so early of the facts of life? At puberty the female undergoes further increase in fat with selected target cells in the layer of outer fat differentially increasing their uptake of labeled fatty acids. Students of human growth view Sophia Loren with awe, wondering how the genetic code leads to the fat patterning that is so distinctively hers!

Beyond such simple wonders are the implications of fatness and the mechanisms that divert the caloric surplus from the building of other tissues to storage as fat and, as lipids, intimately bound up with a variety of metabolic disturbances. Excess fat, even in the newborn, must be viewed with justified suspicion, as a diabetic himself or proof of a pre-diabetic state in his mother. The fat four-year-old is accelerated in development. The fat eight-year-old is already hooked on fatness, committed to a life of over-fatness, for not more than one in ten over-fat adolescents makes it securely to permanently lean older adult life.

But to be honest about it, short of the intestinal by-pass operation, we have no sure remedy for over-fatness in adolescence or in the adult, whether it be the summer camps that serve exercise and sympathy or the measured tinned meals in anal-compulsive cans. Though it is possible to describe the energy metabolism of obesity in a small fraction of a sentence, the various reasons why over-eating is so popular and so hard to beat are far too numerous to mention. The mechanisms by which fatness leads to deadness are also complex themselves. We so rarely distinguish between the fat under-exercised child or adult and the fat well-exercised of either age as to ignore the differences between them.

7.

Now the problem of over-nutrition during growth which we deal with much in our country, and most other countries of the West, is intimately related to size accomplishment. It takes food to build the size we have. But, at the other end of the nutritional spectrum, there is not only size restriction but also developmental delay beyond the expected delay in attaining adult size and sexual maturity. At the extreme of protein-calorie malnutrition, with protein intakes a quarter of ours and with animal protein intake often less than a tenth of ours, growth is inhibited, growth of the tissue mass may actually be reversed, bone and muscle may be lost until the skeleton is a mere shell supporting wasted muscles and a shrunken figure with a distended belly. In such infants and children, with Kwashiorkor and Marasmus, behavioral development is delayed along with size. There may be great delays followed by slow recovery, if there is recovery. In areas of the world where protein malnutrition is common, and by this I include two-thirds of the world, behavioral delays are associated with delays in physical development. And the sixty-four dollar question is whether the underdeveloped and technologically backward countries that are over-farmed and over-peopled are at the same time "underdeveloped" because of long-term cumulative and irrevocable failures of intellective development, nutritional in origin.

It is true that when protein malnutrition lurks, so does infectious disease, the two going together in a kind of symbiosis and both associated in turn with parasites of liver and intestinal tract. Slowly, we are eliminating this triangle, for we know how to alter it by protein supplementation, by nutritional education, by public health measures that cover the latrines and kill the ova, and by the techniques of inoculation and immunization that we ourselves used. However, we are still groping for the research design or designs that will truly tell us whether the protein malnutritions and growth delays in infancy and early childhood are truly productive of adult intellectual deficiency. One of the problems is that we cannot simply project from the Gesell, Bayley, Merrill-Palmer and Binet scores to adult "I.Q." values. At least within our own population the early and late tests have zero correlations. It is a notable fact that one of the most retarded of the Fels children (in early behavior development) was later the greatest number of standard deviations above both national and the Fels intellective means. And we cannot work just from adult intelligence test values, for the children and the populations subject to protein-calorie malnutrition are inherently deficient in the stimuli that make for learning, the motivations to perform, as well as the experience to acquire the information that our conventional "intelligence" tests so greatly prize. Thus it is that one of the most crucial problems of our time, the possible interaction between malnutrition and intellectual development, lies elusively beyond our present grasp. It could explain much in history if it is indeed true. Or, protein-calorie malnutrition in infancy and childhood could be but one of a much larger set of situational determinants of failures to develop the mental faculties we prize.

8.

We are increasingly in possession of knowledge of how the sex chromosomes serve to regulate both growth and development. On theoretical grounds, sisters should be more alike than brothers and this proves to be true for hundreds of aspects of growth and size and timing, and even behavioral development in part. Carried over two generations, with greater similarities of fathers and their daughters (and rather less similarity between fathers and their sons) it appears that some variance in gross size and developmental timing is determined by genes or the one or two X chromosomes than by genes on the remaining twenty-two pairs of autosomes. Never in the history of chromosomal genetics has so much been owed to so few.

By extension, we would expect monozygotic *girl* twins to be more alike than monozygotic *boy* twins, more identical, as it were, and this theoretical fact does obtain in recent Japanese studies. More, and more to our interest, we might expect the female with her pair of X chromosomes to be the better regulated throughout the growing period, showing higher year-to-year and item-to-item correlations. This, too, we now find and though the female is more susceptible to certain genetically-determined defects that suggest X-linked genes, either dominant in nature or additive in effect, it is also true that the female is far more consistent in her developmental course, apparently better regulated in accordance with informational theory that says that a pair of X chromosomes is better than just one.

If this is so, we may even be able to explain the greater longevity of the female on the same chromosomal grounds. The fact that the female matures earlier yet lives longer has long been without satisfactory explanation. In fact, these two facts are in opposition, for early maturation should lead to earlier demise and vice versa. Yet, if X chromosomes are the answer, then less misinformation should slip into the genetic code of the XX or female. At the same time, it is only fair to observe that there is an XXX chromosomal type, a "super-female" with three X chromosomes, whose longevity has not yet been ascertained, as well as multiple X's in connection with a Y, such as the XXY, XXXY and even the XXXXY. The growth and speed of growth are of major interest in these chromosomal abnormalities and in others where there is reduplication or translocation of parts or pieces of chromosomes other than those that have to do with sex.

One of the great break-throughs in the understanding of human growth abnormalities came when we applied techniques long used by plant geneticists to the study of human chromosomal types. The results have been startling from the start, knowing now how many different "sexes" there are among us instead of the long-accepted two. Chromosomal deletions and reduplications and translocations help to explain previously inexplicable diseases and disorders and they give us hints of more possibilities too.

9.

Above the chromosome level at their intra-cellular sites we have the cells themselves and their sizes. And it turns out that they are not just standard, a given size for a given cell in a given tissue, but in a given mass there may be more or less and larger or smaller cells. For obesity tissue, the possibility exists of more fat cells — but each less fat — or fewer cells, each single one literally more obese. Other body cells share in this predisposition, according to the hormonal milieu, and so growth has come to show a third parameter. Conventionally, we long measured size, that is size of body, but not what was in it. Then we came to think of the tissues of the body, the amounts and relative amounts of the tissues, but not necessarily the sizes of the constituent cells. Now we conceive of people who are small because they have small cells and people who are small because they have a small number of cells. Miniaturization at the human level provides a choice and a choice of parameters for genetic control. Since chromosomal size is inheritable in part, do big chromosomes go with big cells and vice versa? Does the ratio of RNA to DNA have a constant meaning if the chromosomes can vary in their mass too?

At the same time, renewed interest at the cellular level has its parallel in variations in the fine structure of human beings. In cancellous bone there are familial variations. Some of us have a greater number of trabecular elements and some people less. The former should have higher bone densities unless the trabecular walls are reduced in turn. Compression strength of vertebrae should vary with the type of trabecularization for the same amount of mineral expressed in grams per cubic centimeter of bone. Other aspects of fine structure between the cell size and the tissue size now come into our thinking. In fact, the proper title of this primer should not be Physical and Chemical Growth, but rather The Size, Number and Arrangement of Cells, the Proportions of Various Tissues and Their Types in Relationship to the Gross Dimensions of the Axial and Appendicular Skeleton and Its Soft Parts and Organs. Such an expanded title is a somewhat closer approximation to present problems and prospects in human physical development.

10.

All studies of human physical and chemical growth can be described under two categories. The first is why we grow, and the second is how we grow. The latter began at the level of simple description of elementary linear measurements 200 years ago but has become infinitely more complicated, technically far more sophisticated, and far more meaningful since that time. By way of example, to describe numerically the detailed cortical and medullary remodeling at a single section, on a single long bone over a ten-year period requires no less than 216 individual measurements. To describe total bone remodeling of that same tibia at centimeter intervals over the same time period demands highly sophisticated, card-punching, electronic measuring equipment, with a handful of punch cards the permanent record of remodeling of that single bone in one individual! In this respect, we have come infinitely far, yet no distance at all. But the picture that we get of bone remodeling during growth is an utterly fascinating one. The bone remodels from the outside in and the inside out, expanding on the outside at one point while contracting on the outside at another, such that a point initially on the outside of a bone comes to lie on its inside and a point — near the metaphyseal end — originally on the inside, comes to lie on the outside. And to finish this discussion of complexity, parts of the bone even remodel sidewise in the course of growth, apposition taking place more on the medial side and resorption on the lateral, so that the whole bone remodels inside out and outside in, sidewise and endwise all at once, making use in part of mineral given up in resorption for the building of new bone and making use at all times of both new mineral and that which has been reused.[3] From such complexity of information and instrumentation come today's "simple" descriptions of growth.

Why growth takes place is also our goal to ascertain, as well as the factors that modify the genetic potential and the mechanisms by which the potential becomes a fact. If the miniature pig is not miniaturized when grown within a full-sized dam, we know something about how the genetic code can be defeated. We know the essentiality of growth hormone for growth, beyond a given level of size, but, as the Johns Hopkins group has shown, its less-than-essential nature for growth *up* to that size. We can show that for a single tooth, one part (the crown) is scarcely affected by growth hormone or its lack, while another part (the root) behaves for all the world like stature itself. Following the leads of animal husbandry, where copper and zinc deficiency states are well known, we have come to understand the essentiality of these metals for cellular growth. We have seen how the absence of a hormone (which ordinarily limits growth) can be simulated at normal levels if antibodies are built up to that hormone as fast as it is secreted. We have come to discover how the brain itself affects the maturing of the pituitary gland that elaborates the gonadotrophins that stimulate the secretion of the sex hormones that affect the maturation of the brain. The word "how" describes these and other interactions at the morphological level, where growth at one part shapes the growth at the other, as with the degree of eruption of one tooth that determines the occlusal level of its opponent. It describes how the mass of muscle operating through its attachments stimulates the growth of bone, both cortical and medullary, how (as seen in paralytic poliomyelitis) failures of neural-mediation lead to decrease of muscle, loss of bone, reduction of marrow, and yet — on the outer surface of the affected limb — to an increase in subcutaneous fat.

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THE NUMBER AND SIZE OF CELLS Donald B. Cheek, M.D.

I will present information comparing the growth of rodents with primate growth and raise the question whether we can draw conclusions (from rodent data) which are applicable to the human.

Some seven years ago we removed the female offspring from 20 litters of albino mice at 19 days, and substituted males. In some instances we reduced or increased the litter size at birth.

Now, in the first illustration (which is taken from figure 1, Am. J. Physiol. 205:913, 1963), one can see the general pattern of growth in these mice, as determined from whole body analyses. The typical sigmoid change of body weight with time is well known to all students of growth.

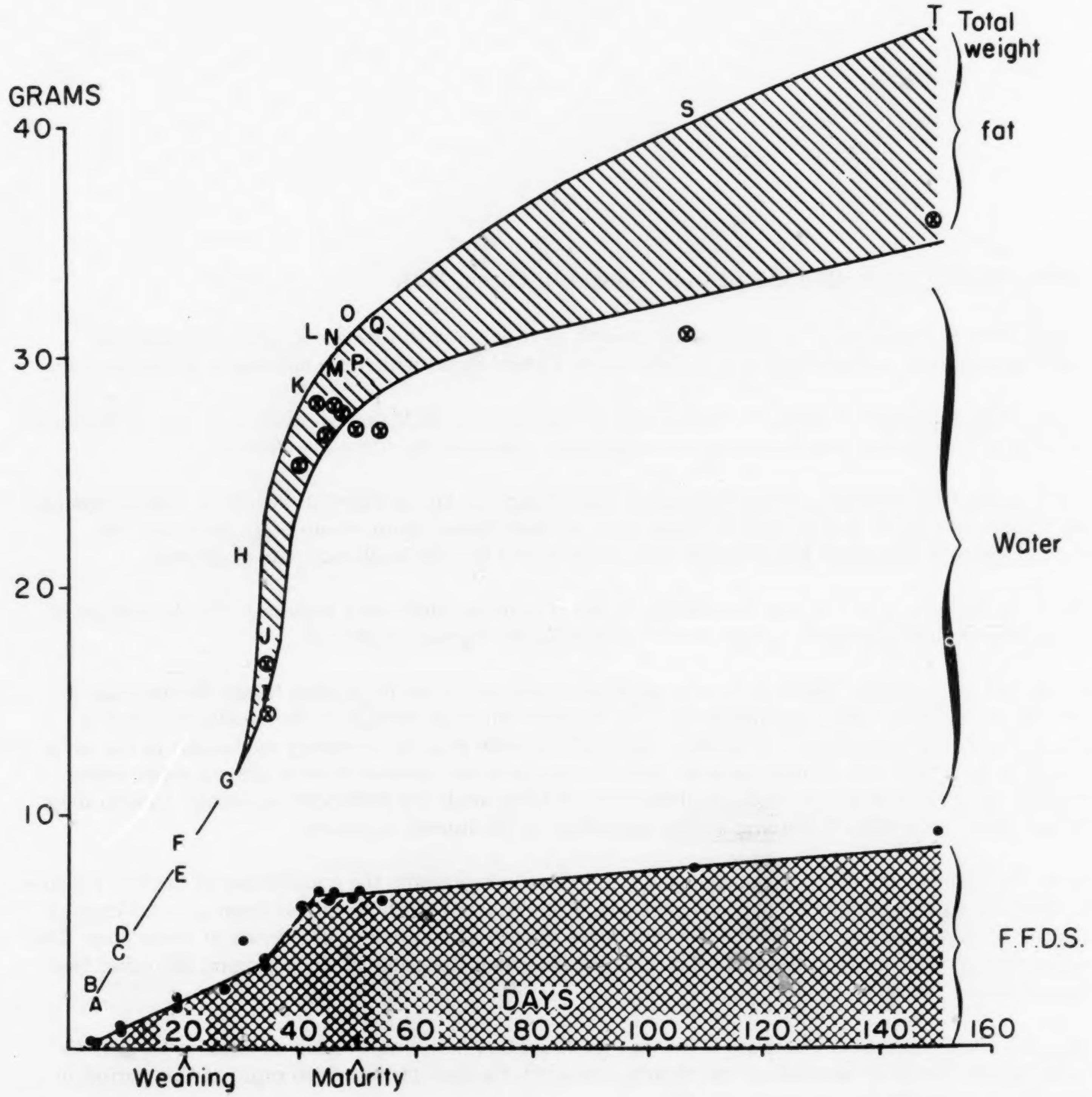
The first thing to notice is that the growth of fat is minimal until after weaning. The deposition of fat in adipocytes is delayed in rats, in comparison to the human or primate.

In the full term human infant there is a significant amount of fat in adipose tissue. Baker (Am. J. Clin. Nutr. 22:829, 1969) estimates that one third of the body weight of the newborn infant is adipose tissue. This may have important implications with respect to energy exchanges in the early period of postnatal life. It may indicate that the sympathetic nervous system plays a more important role in man than in rat, in the mobilization of fatty acids for metabolic substrate. Insulin may be especially important in leading to fat deposition in the human newborn.

In the bottom of this illustration the cross-hatched area represents the acquisition of protein (or the fat-free dry solid, which is 80 percent protein). The period of study is spread from about 2 days of age to 150 days. We can reduce the sigmoid curve in respect to protein to a series of three lines. The adolescent growth spurt in the male mouse is the line with the greatest slope joining the other two lines of lesser slope.

This is an important point because it shows that rodents, like humans, have an adolescent growth spurt, which has been heretofore not clearly observed. Because growth is so rapid at this period in rodents, the change can be easily missed.

Note that these litters are labeled A, B, C, D, E, F, and so on. Although this arrangement is in accordance with their postnatal age at sacrifice, we find that there is some discrepancy between age and size in some litters. Group H, for example, was advanced: this is because it was a reduced litter. Food intake influences growth. Laid (Growth 31:345, 1967) has recently compared the human growth curve with that of the rat. He points out that there is in the human growth curve an initial phase extending from birth to about 6 years, the line rising rapidly at first, then decelerating. This phase is followed by a period of linear relationship until adolescence begins, when the slope increases again. The period of "slow (linear) growth" between the perinatal period and adolescence is missing in the rodent.



(From Am. J. Physiol., *205*, 914, 1963)

At 37 days male albino mice reach sexual maturation; the female mouse has first estrus on the 37th day. This point is near the middle of the adolescent spurt (protein line) or at the point of maximal inflection (weight curve).

It would be nice if the timing of development were as predictable for humans. But time of sexual maturation can be scattered over a four to five year period; and so the problem of assessing maturational age is an important issue in human development. We have devoted a chapter in our

book, Human Growth (Lea and Febiger, 1968), to the subject. By using parameters of body composition (e.g. body water, cell mass, cell number and body length) it is possible to predict chronological age from body size for a normal child. In the male infant, for example, one can predict age to ±0.14 years, which surpasses the accuracy possible from bone or dental age. Application of the appropriate equations to children with growth retardation demonstrates, for example, that the child with congenital heart disease is, after five years of age, always two years behind in time.

Now what other comparisons can we draw from the study of rodents? Another way of looking at growth is to study the weight velocity curve. This approach has been very popular with some workers but it is not entirely satisfactory to the statistician.

But in mice the increments of weight per day relative to the existing weight or percentage weight gain per day show two peaks in the postnatal period (figure 2). The first peak is about the middle of weaning. It is of interest that this is the period in rodents where the increment of brain DNA, or the growth of the brain cells, reaches a peak and myelination is most active. We find that increments in brain DNA cease just prior to weaning. The second peak is at 37 days. This is the period of sexual maturation and the period of maximal somatic growth. For the human the first peak would occur prior to or at birth. The rate of human brain growth would be maximal then (Davidson and Dobbing, Brit. Med. Bull. 22:41, 1966) although the increment in brain DNA does not stop until 6 months postnatally (Winick, Pediat. Res. 2:352, 1968).

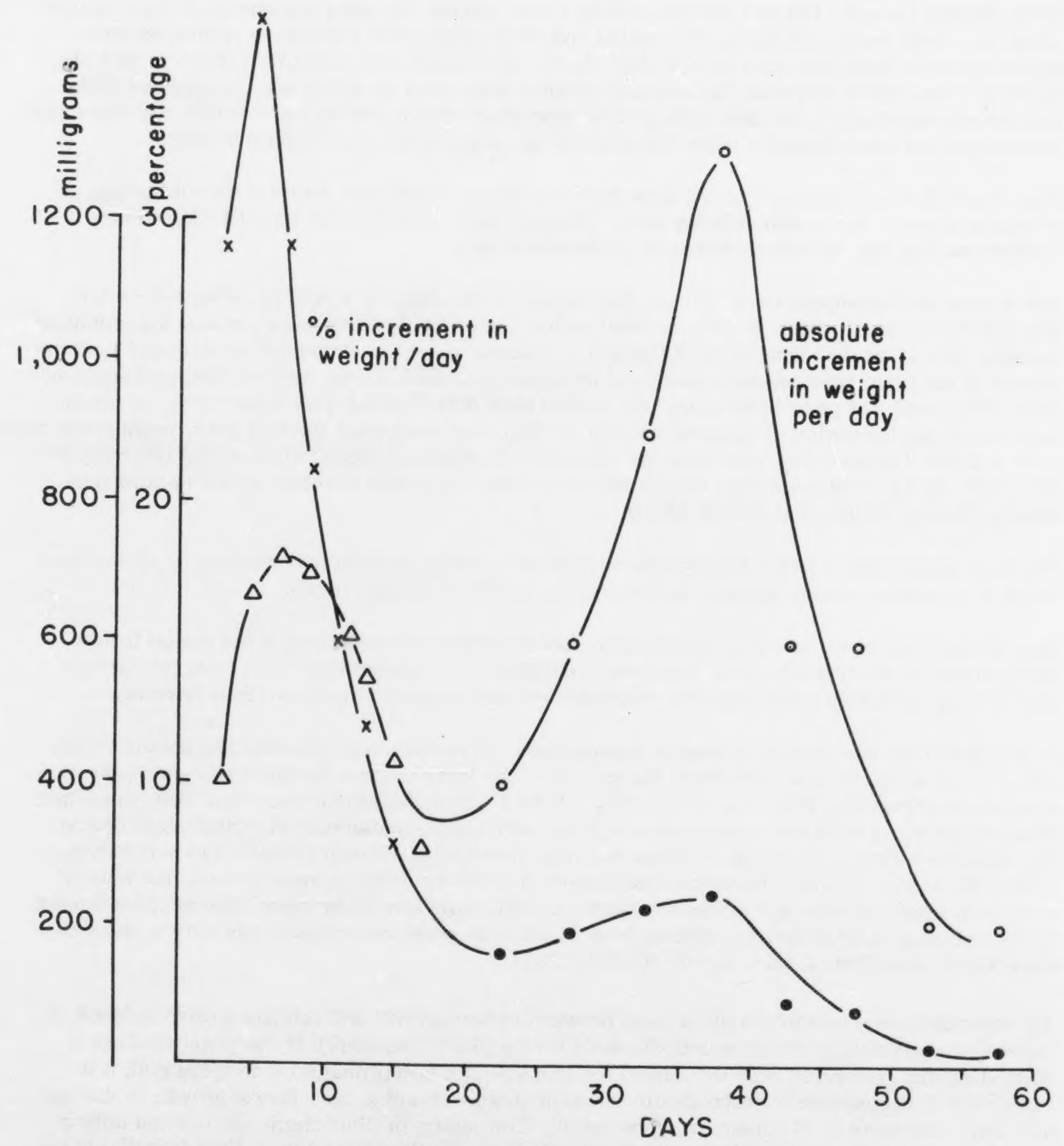
The next noteworthy point is the rapidity with which rodents go from mid-weaning to adolescence. There is no waiting period between the two peaks, as there is in the human.

Here we raise another issue. Most neurologists feel this delay for the human is the period for the development of intelligence. Here branching of dendrites or "connectivity" is in evidence. We can draw a sharp distinction then between rodent growth and primate growth on these grounds.

At the same time it is clear that somatic growth does not parallel brain growth. The growth of the brain is on a different time scale from the growth of the body as a whole. Proportionately, the brain grows most prenatally. The other components of the body (extracellular mass, lean body mass, cell mass) in any given child grow proportionately and with simple mathematical relationships one to the other, and with acceleration as sexual maturity approaches (Human Growth, Lea and Febiger, 1968). To be sure, growth of visceral mass departs to some extent from muscle mass, and muscle mass from total cell mass and fat mass certainly departs from lean body mass, depending on the sex, as the second peak of growth is reached. In rats, cell mass grows commensurately with extracellular mass (Cheek and West, J. Clin. Invest. 36:840, 1957).

An important point relating to differences between rodent growth and primate growth is found in the recent observations of Payne and Wheeler (Nature 215:1134, 1967). If the gestational age is plotted against gestational size (or weight) for primates and non-primates on a log-log grid, it is found that 2 lines appear for each group. The primates are found to have slower growth in size per unit time. The same is, of course, true postnatally. The calorie-protein supply in maternal milk is notably less for primates than for non-primates. Perhaps this slower growth and the fact that in the primate we are usually dealing with a single embryo, protects the primate fetus and infant from maternal malnutrition.

This is important since a number of studies show that in the rat restricted nutrition (mainly protein) during pregnancy (Zamenhoff et al, Science 160:322, 1968) (Winick and Noble, J. Nutr. 89:300, 1966) (Zeman and Stansbrough, J. Nutr. 99:274, 1969) (Blackwell et al, J. of Nutr. 97:79, 1969) produces a reduction in body size and of brain DNA content. It has been implied that this indicates neuronal loss or loss of intelligence. It should be pointed out that the neuronal to neuroglial ratio is



(From Cheek, Donald B., *Human Growth*, p. 13, Lea & Febiger, Philadelphia, 1968.)

1:10, and while the subsequent behavior of these rats is of interest (Caldwell and Churchill, Neurology 17:95, 1967), there is no reason to believe that mental impairment results for the primate fetus when the mother is subjected to protein calorie under-nutrition, as inferred by others (Winick. J. of Ped. 74:667, 1969). Only future work will confirm or deny this statement, but if one considers that maternal rats accrete 25% of their body weight within 3 weeks to produce a litter, the possibly greater significance of protein restriction for the rat becomes obvious.

We have seen the upward slope of increase in protein with age in mice, the accelerated slope at sexual maturation, and the plateau reached shortly thereafter. If we inspect the pattern of increase for total body deoxyribonucleic acid (DNA) for the rat, a similar curve emerges. There is an upward increase in total DNA with time in rats postnatally; then, after sexual maturation, there is a plateau. This plateau is referred to by Leblond as "the steady state of cell population" where cells may come and go but the body tends to maintain a constant cell number. This conclusion is valid, since the amount of DNA within the nucleus is constant for all mammals; so that DNA content reflects cell number. Since protein synthesis accompanies DNA replication, we can regard growth as being mainly a process of increase in the size and number of cells. Over the years we have found that the ratio of cell water to protein is constant during growth; accordingly, the ratio of protein to DNA is a valid measure of cell size.

I wish now to discuss with you some of our observations on cell growth in muscle and liver. In man the excretion of 1 gram of creatinine per day is equivalent to 20 kg. of muscle mass. From the DNA content of a small biopsy sample of muscle, therefore, one can calculate, knowing creatinine excretion, the cell number and then the total number of cells in the musculature (about 10^{12}). Our first surprise was to find out that the 60-year-old thesis that all postnatal growth of human muscle was by increase in fibre size was not correct. Indeed, there was about a 14 to 20 fold increase in DNA (or nuclear number) in human muscle for the male from infancy to 17 years. At the same time there was a 2 to 3 fold increase in the protein/DNA ratio which illustrates the coincidental growth in cell size.

The increase with time in the number of nuclei in muscle of boys followed a quadratic equation. If one considers infancy to adolescence, the relationship is cubic. Up until the age of two years the number of nuclei in muscle increases rapidly, then there is a period of slow increase from 2 to 9 years. After 9 years the nuclear increase is again remarkable and continues until a steady state is reached. For girls, this second spurt is less marked than in boys, so that the relationship between 4 and 17 years of age can be expressed as a simple straight line. With respect to protein/DNA ratio, for girls and boys the increase in muscle cell size presents a quadratic relationship to muscle mass (or body size), whereas the relationship of cell size of muscle to time is linear. These relationships are discussed elsewhere (Human Growth, Lea & Febiger, 1968) (Pediatrics 41:30, 1968) (Cheek and Hill, Fed. Proc., June, 1970). Girls increased their muscle cell size more rapidly than boys, whereas boys increased their cell number more rapidly than girls. The average age of 10½ years appears to be important. At this time the increase in the number of muscle nuclei begins to increase for boys beyond that for girls so that eventually the ratio is 3:2 at sexual maturity. For girls at 10½ years the size of muscle cells exceeds that for boys and becomes stable. It is probable that boys surpass girls with respect to protein/DNA ratios after adolescence.

In studies on rats, the same sex differences were established but it becomes clear that rats start off with much smaller cells shortly after birth and thus much more emphasis is placed on cell size increase and less on cell number increase during growth. A similar situation exists for fat cells and in the comparisons of rats with humans.

We were able to show that removal of ovaries in the weanling rat caused the female to adopt the male pattern of muscle cell growth. There was a 3:2 ratio at maturity for the number of muscle nuclei present between the castrated rats and normal females. Thus we are inclined to the view that ovarian hormones are important to the sex differences in the cell growth of rats. On the other hand, we are unimpressed with the degree of alteration in muscle cell growth in castrated adrenalectomized male rats (receiving desoxycorticosterone), although it is clear from the work of Kochakian that androgens in rats are important. Here again we may be dealing with a difference between rodents and humans. It is difficult to escape the conclusion that androgens play an important role in the male adolescent growth spurt.

Perhaps the two most important hormones involved in growth are insulin and growth hormone. Some years ago we studied the pattern of cellular growth in male hypophysectomized rats (Bull. Johns Hopkins Hosp. 117:306, 1965). Removal of the pituitary at 3 weeks of age caused cessation of DNA replication. It became clear to us that the pituitary was crucial for the process of DNA replication. Coincidental experiments involving thyroid ablation in rats showed us that cell multiplication was slowed. Since it is known that thyroid ablation in rats leads to degeneration of acidophil cells in the pituitary, we suggested that growth hormone was involved in the replication of DNA. Confirmation of this thesis came from the observations of muscle cells and cell population in children with pituitary dwarfism. Given growth hormone, they experienced excessive growth of muscle relative to height, and a significant increase in the cell number in muscle.

More recently, we have been concerned with the study of the actions of insulin and growth hormone on tissues of hypophysectomized rats (Cheek and Graystone, Pediat. Res. 3:77, 1969).

The liver can be considered, for example. While muscle tissue grows by increase in the number of nuclei and increments in protein, a different situation pertains in the liver. Here the diploid cells give rise to tetraploid or octaploid cells or cells of higher series. Thus the 2 DNA units of the diploid cell become 4 DNA or 8 DNA units, perhaps even 32 DNA units. There is no division of the nucleus. In this process of polyploidy the nuclear volume enlarges in a geometric progression and Epstein (Nat. Acad. Sci. 57:327, 1967) has shown that the cytoplasm increases commensurately with the degree of ploidy so that a tetraploid cell behaves as two diploid cells in terms of mass composition.

The hypophysectomized rat shows no polyploidy in the liver. We have found that when either insulin or growth hormone is injected over an 11-day period into such rats, there is hepatic growth. The weights of the livers, the protein content, and the RNA content are similar whether insulin or growth hormone is given. However, the DNA contents are grossly dissimilar. The injection of growth hormone produces DNA replication. The injection of insulin does not. Thus, growth hormone creates new cells or induces polyploidy: these liver cells have lower levels of protein and RNA/unit DNA than do livers from the rats receiving insulin. Clearly, insulin is intimately involved in protein accretion and cell size increase (probably without the aid of growth hormone), whereas growth hormone only achieves protein synthesis if some insulin is available. If you block endogenous insulin by injecting adrenalin, but continue to give growth hormone, only DNA replication occurs. Both hormones appear necessary for growth in all mammals.

Finally, one might mention briefly the relationship of nutrition to cell growth in the postnatal period. It has been known for many years, from the work of Parkes in England and Gates in this country, that over-crowding of litters produces growth retardation. More recently, deleterious effects on the brain myelination have been described (Chase et al., Pediatrics 40:551, 1967).

Clearly this subject is complicated, but in terms of restriction of cell multiplication or of increase in cell size, the time at which the insult or restriction occurs is clearly important. Winick (J. Nutr. 89:300, 1966) has shown that rats undernourished from weaning (protein and calorie restriction) ultimately have reduced cell number. Our own work has shown us that rats restricted in calorie intake *per se* for from 3 to 6 weeks have big or normal muscle and liver cells, for body size, but some slowing down of DNA replication. There is no reason to believe that eventually cell number will not reach expected levels (Elliott and Cheek, J. of Pediat. 69:958, 1966). There is an increased protein/DNA ratio, and increased amounts of RNA and of certain enzymes and trace metals per unit DNA (Graystone and Cheek, Pediat. Res. 3:66, 1969, and 3:433, 1969).

By contrast, work of Mendes and Waterlow (Brit. J. Nutr. 12:74, 1958) on protein deficiency leads to the conclusion that tissue cells are very small. Catchup growth may be impossible for the rat with initial protein deficiency. In our opinion the pattern of cell growth is related to the ratio of protein to caloric intake. Indeed the progress of our work would lead us to believe that calories *per se* affect cell replication while protein intake influences cell size or cytoplasmic growth. We suspect that protein intake will modify insulin release, whereas caloric intake somehow influences the response of tissues to growth hormone (Cheek and Hill, Fed. Proc., June, 1970). Such a relationship probably holds for all mammals. The above thesis is supported by our observations on kwashiorkor and marasmus, where circulating insulin was reduced before and after rehabilitation. Muscle cell size was grossly reduced with reductions of RNA:DNA, protein:DNA, Mg:DNA and Zn:DNA. These determinants did not always reach expected levels following rehabilitation. Appraisal of the nuclear number in muscle did not show a gross loss, initially, while after rehabilitation the values were normal (Cheek, Hill, Cordano and Graham, Pediat. Res. 4:135, 1970). One suspects that the primate responds differently from the rat in protein-calorie restriction.

In conclusion, we have endeavored to raise issues concerning primate growth by inspecting non-primate growth. While the sigmoid curve or a more simple expression of growth in body size with time usually pertains, there are differences in the timing of events. For the human there is a period of dendrite branching and "connectivity", during which somatic growth is slow. There is the period associating accelerated somatic growth with sexual maturation in all mammals. The latter is much more prominent in the male than the female, and is particularly manifest by increase in cell number.

Sex differences at the cellular, tissue, and whole body level are particularly prominent during growth, especially during adolescent growth. Growth is directly influenced by genes, hormones, nutrition, and the timing of events. Nutritional restriction makes an impact on cellular growth which may depend upon whether just calories or both protein and calories or protein alone are involved. Differences may exist between the primate and non-primate; whether restricted nutrition during pregnancy has an effect on the fetus of the primate remains to be shown. Hormones are involved in increments in cell size and cell number and influence sex-specific patterns of cellular growth. In the presence of adequate nutrition, growth hormone is involved in DNA replication, whereas insulin is the hormone concerned mainly with protein synthesis and cell size; but both work together.

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NUTRITION AND GROWTH Samuel J. Fomon, M.D.

Studies described by René Dubos suggest that under-nutrition of the rat prenatally or during the early postnatal period may be associated with increased longevity. Such studies are of enormous importance, since they may add to our understanding of effects of early nutrition on subsequent rate of growth, health and longevity.

To attain proper perspective about such studies it seems important to review evidence of three types: (1) Nutrition of animals during early life may influence adult size even though no attempt at underfeeding or overfeeding is made after weaning. (2) With rats that have been normally nourished to the time of weaning, the amount and type of food they are permitted to consume during the remainder of their lives has an important influence on development of various diseases and on longevity. (3) With *ad libitum* feeding of human infants, whether full-size or of low birth weight, caloric concentration of the feeding exerts an important influence on rate of growth.

Early Nutrition and Adult Size

As previously summarized (Fomon, 1967), data from several sources indicate that under-nutrition of animals during early growth results in reduction in size of the mature animal even though abundant food supply is provided after the period of deprivation. Reduction in size of a rat litter with consequent provision of more milk for each individual results in more rapid growth before weaning. A number of investigators have shown that rats from small litters not only grow more rapidly before weaning but continue after weaning in spite of *ad libitum* feeding to be larger than rats from large litters. As may be seen from Table 1, these differences in size persist into adult life; they can be shown to reflect differences in cell number in the various organs and tissues, whereas the size of individual cells is relatively little affected.

In both calves and rats the timing of nutritional deprivation is of considerable importance; it appears that prenatal or early postnatal deprivation exerts a much greater influence on subsequent rate of growth than does deprivation of equal duration imposed later in life.

Post-Weaning Nutrition, Incidence of Disease and Longevity

As discussed elsewhere (Fomon, 1967), McCay and associates found that rats fed *ad libitum* were more susceptible than under-fed rats to chronic lung disease, various tumors and renal disease. The frequency of these conditions appeared to be sufficient to explain the shortened life span. Findings of other investigators provide general support for the conclusions of McCay et al. For example, Berg and Simms (1965) found the relative incidence of lesions of four major diseases to be considerably greater at a specified age in rats fed *ad libitum* than in those fed restricted amounts (Fig. 1). It may be noted that renal disease ("nephrosis") was present in over 90 percent of 700-day-old rats fed *ad libitum* but was absent in 700-day-old rats fed restricted amounts of the same diet. Similarly, Bras and Ross (1964) found that in rats fed semisynthetic diets the incidence of "progressive glomerulonephrosis" (presumably the same disease) differed remarkably depending on whether they were fed *ad libitum* or in restricted amounts.

Not only specific diseases but the onset of a variety of changes ordinarily associated with aging can be delayed by dietary restriction. In rats, for example, Ross (1959) found that after one and a half years of ad libitum ingestion of a commercial diet, most rats were obese and sluggish, had cataracts, chronic dermatitis of the extremeties, coarse, sparse, discolored hair and dry scaly skin. With restricted diets of various types it was found that even at two and a half years of age the animals were quite active, relatively thin, had thick coats of fine hair, no dermatitis, rarely showed evidence of disease and appeared to be much younger than their actual ages.

The extent to which similar age-associated changes in the human may be accelerated or retarded by dietary influences is unknown but is clearly an important area of investigation.

Caloric Intake and Rate of Growth of Human Infants

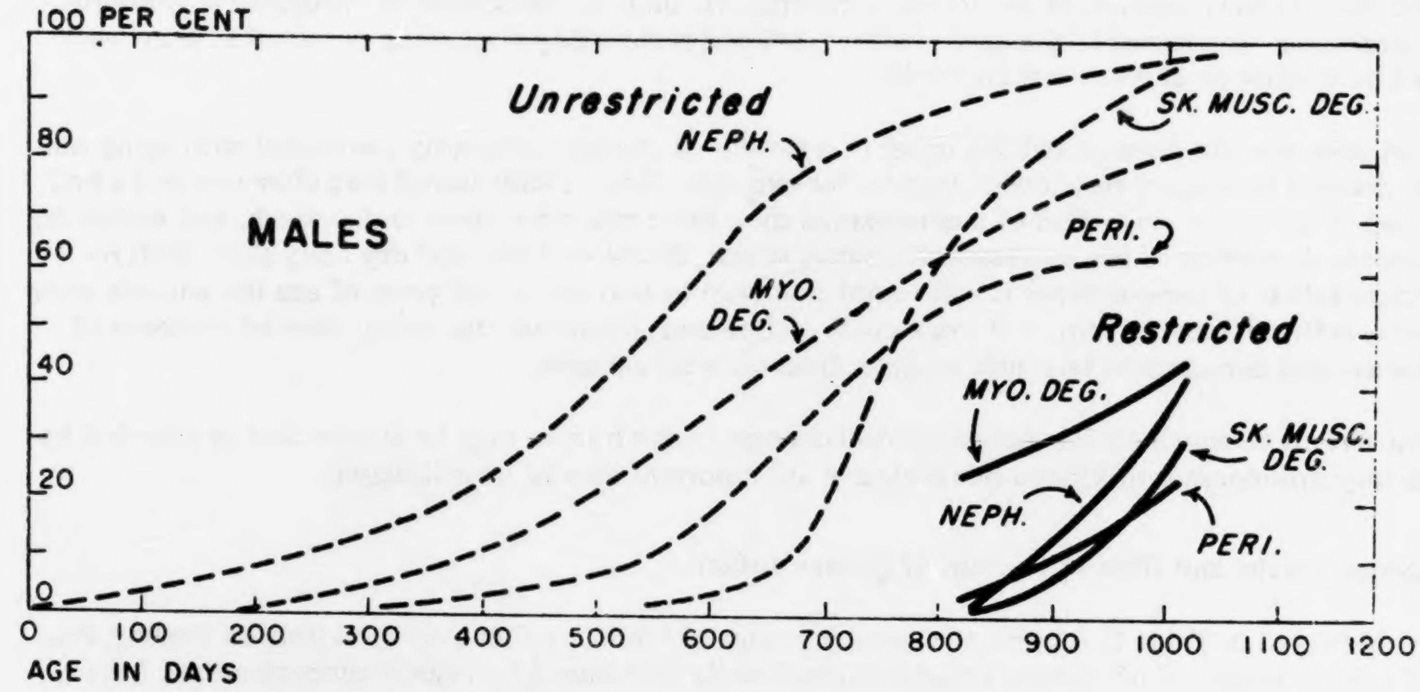
As indicated in Table 2, reports of several investigators indicate that during ad libitum feeding, rate of gain in weight of premature infants is significantly influenced by caloric concentration of the formula. Recent studies with full size infants (Table 3) suggest that weight gain is similarly influenced by caloric concentration of the formula, at least during the first 42 days after birth.

We do not yet know whether severe and prolonged nutritional deprivation during human infancy will result in reduction in body size at maturity when food is permitted ad libitum after infancy. Children recovering from kwashiorkor appear to grow rapidly for several months but, in general, remain smaller than their peers for at least several years. However, as stated by Dean (1962), it has not yet been possible to conduct a long continued, well controlled trial with ample diet to reveal the true growth potential of such children.

Conclusions

From the studies mentioned, it seems evident that in certain experimental animals, the plane of nutrition during the perinatal period influences both rate of growth and ultimate adult size, even when *ad libitum* feeding is permitted after the time of weaning. The unpublished data presented by René Dubos suggest that the decreased adult size of rats resulting from moderate nutritional restriction during the perinatal period may be associated with increased life span. Thus, it seems possible that ("voluntarily") decreased food intake during *ad libitum* feeding may occur as a result of early nutritional imprinting. Furthermore, this voluntary restriction of food intake may be associated with the same beneficial consequences that have been observed when involuntary food restriction is imposed from the time of weaning until death. Surely, this also is an extremely important area for further study.

Rate of growth of the human infant, whether of low birth weight or full size, can be influenced by caloric concentration of the formula during *ad libitum* feeding in the early weeks of postnatal life. Whether such alteration of growth in the neonatal period has significant later consequences in relation to adult size, incidence of disease or longevity is as yet unknown.



(From Fomon, Samuel J.: *Infant Nutrition*, p. 270, W. B. Saunders Company, Philadelphia and London, 1967.)

Table 1. Adult Body Size Attained by Rats Overfed or Underfed During the Preweaning Period and Fed Ad Libitum Thereafter*

	Litter Size	*Body Weight (gm)*	
		At weaning	*Adult*
Underfed	**18**	**28.6**	**297.1**
Control	**9-12**	**59.1**	**376.4**
Overfed	**3-6**	**64.2**	**402.8**

***Data of Winick and Noble (1966, 1967).**
(From Fomon, S. J.: Infant Nutrition, Philadelphia, W. B. Saunders Co., 1967.)

Table 2. Influence of Two Levels of Caloric Concentration of Formula on Rate of Gain in Weight of Premature Infants

Number of Infants	*Initial Weight (gm)*	*Formula Concentration (kcal/100 ml)*	*Caloric Intake (kcal/kg/day*	*Weight Gains (gm/day)*	*Comment*	*Investigators*
10	**1120-2040**	**133**	**155-180***	**44**	**Growth rates of long bones not significantly different in two groups.**	**Snyderman & Holt (1961)**
11	**1360-1930**	**67**	**120-130***	**27**		
115	**1360-1770**	**138†**	**281**	**42**	**Values for weight gain calculated from assumed mean birth weight of 1565 gm and mean number of days to reach weight of 2500 gm.**	**Falkner et al. (1962)**
90	**1360-1770**	**86‡**	**231**	**29**		
11	**1301-1700**	**133**		**42**	**Caloric intakes by infants receiving 133 kcal/100 ml twice as great as those by infants receiving 67 kcal/100 ml; growth rates of long bones not significantly different in two groups.**	**Combes & Pratt (1961)**
13	**1301-1700**	**67**		**32**		

***After 10 days of age**
†Mean value (range: 100-158).
‡Mean value (range: 67-100).
(From Fomon, S. J.: Infant Nutrition, Philadelphia, W. B. Saunders Co., 1967.)

Table 3. Caloric Intakes and Rates of Gain in Weight from 8 to 42 Days of Age by Fullsize Male Infants Fed Ad Libitum

Concentration of Formula **(kcal/100ml)**	*Number of Subjects*	*Weight at Age 8 days* **(gm)**		*Caloric Intake* **(kcal/day)**		*Gain in Weight* **(gm/day)**	
		mean	**S.D.***	**mean**	**S.D.**	**mean**	**S.D.**
67	**13**	**3299**	**504**	**451**	**56**	**36**	**7**
133	**11**	**3534**	**395**	**593**	**84**	**51**	**6**

***Standard deviation**
Data of Fomon et al., 1969

THE MEASUREMENT OF GROWTH Josef Brožek, Ph.D.

The other panelists and I have shared a concern for *changes* in body composition, whether they be associated with the passage of time (that is, with growth and development on the one end of the age spectrum, or with aging — at the other end of the lifespan) or whether these changes be induced experimentally (this means, primarily, nutritionally).

Once, in a moment of exuberant enthusiasm, I referred to the quantitative description of body composition as physical anthropology's "fourth dimension" (Brožek, 1963). I shall settle for the "third dimension", but I am still ready to argue that the measurement of body components (or compartments) yields a radically new and important view of man — a new quantitative portrait of the "inner man".

The techniques for measuring body composition — somatometric, radiographic, densitometric, biochemical — were the object of a conference, held in 1959 (Brožek & Henschel, 1961). It was followed up by conferences held in New York (Brožek, 1963a) and at London (Brožek, 1965) at which recent advances in the methods for the study of body composition were presented and reviewed. At all three conferences research on body composition was approached as a genuinely interdisciplinary problem calling for a variety of skills.

For the benefit of students of physical anthropology the methods were described in various media, including a textbook of physical anthropology (Brožek, 1960). The issue of "models" of body composition and equations for estimating selected body compartments was reconsidered recently (Brožek, 1966). This represented an attempt at a synthesis, beginning with the anatomist's handiwork and going on to the somatometric models and to procedures based on determinations of body density and/or body water. Due consideration was given to the approaches based on the measurement of whole-body radioactivity generated by the naturally occurring isotope of potassium (K^{40}) and to the multicomponental system developed by F. D. Moore and his co-workers in the context of surgical treatment and research.

The data obtained by the application of "somatolytic" compositional methods to the study of human growth have been recently summarized in a textbook (Owen & Brožek, 1966) and in a journal article (Brožek, 1966a).

Let's now consider the problems before us. As is true of any biomedical problem, acquisition of new information on body composition can advance along three fronts: First, methodological; secondly, theoretical; and thirdly, applied.

We deal here with three different questions:

First, how can we *measure better* — more economically, more conveniently, more precisely, more reliably — what we wish to measure?

Secondly, what are the *factors* that affect the phenomena under study? What are the underlying mechanisms of change and growth?

And, thirdly, what *useful information* can be obtained by these techniques?

I shall limit my comments to the applied area and, more specifically, to the considerations of body composition in the context of human nutrition. I shall be speaking about groups and more specifically about populations, not about the application of compositional techniques to the study of patients, of individuals.

Clearly, populations consist of individuals, but the focus on populations as such has specific and important implications for the kind of questions that we can ask and for the kind of methods that we can apply.

As consultant to the section of nutrition of the World Health Organization, I have been concerned for some time with some questions that sound very simple, if not simple-minded:

What changes are taking place in the nutritional status of the world's populations?

What are the criteria in terms of which an on-going surveillance of this aspect of the biology of mankind can be carried out?

Let's keep these two questions separated, since the answers will be quite different:

To the first question: "What is happening to the nutritional status of the world?" the answer is, to a large extent that we do not know. The basic data are not available, except very sporadically. A map designed to portray the *changes* in the nutritional status of populations would be mostly white, showing the extent of our ignorance.

The answer to the second question, to the issue of workable criteria of nutritional status applicable on a worldwide basis, is more encouraging. Furthermore, it is — I believe — directly relevant to our considerations in this session, in the context of thinking about the applied aspects of growth.

For these purposes, then, "nutritional status" of populations can be defined in terms of the physique of the growing child and of the adult — some aspects of the physique, anyhow.

Physique is, to be sure, a complex phenomenon and the resultant of several factors: the genetic makeup, food intake and food utilization, physical activity and disease. Consequently, we have to be circumspect in utilizing physique as a criterion of nutritional status, and I have no objections whatsoever to the suggestion that nutritional status so defined should be always put in quotation marks.

Nevertheless, variations in food intake and food utilization, other things being equal (which they rarely are), will affect markedly the child's growth and some aspects, especially compositional, of the adult physique. This is why we are justified in utilizing anthropometric data, including soft-tissue measurement, as criteria of nutritional status.

But let me repeat: One must keep in mind the fact that in the analytic interpretation of the anthropometric data we must consider not only food intake but also the genetic makeup of a given population and the environment of its socioeconomic, climatic, medical, and cultural aspects.

With regard to methods, it is generally agreed that anthropometric data — properly selected, properly taken and recorded, and properly evaluated — represent a useful basis for the assessment of the nutritional status of populations.

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The number of subjects that need to be examined is unavoidably large. Moreover, we are concerned with *on-going* surveillance, calling for repeated measurements of samples drawn from carefully defined populations, for measurements repeated at the intervals of perhaps five to ten years over decades and perhaps centuries.

Consequently, while the approach must be sensitive to changes in food intake and related factors, the procedures must be at the same time simple and practical in terms of instrumentation, the technical skills required for making the measurements, and the time that must be invested by the subject and by the person taking the measurements.

Human physique is a complex phenomenon. Its quantitative description is a matter of "successive approximations." These approximations may vary from the very grossest approach based on a single variable to sophisticated multi-dimensional systems.

Clearly, only the simplest approaches are of relevance in the present context. I shall not go into the details which quickly become cumbersome as we go from a single variable measured on a single age group to situations in which a number of variables are measured in several age groups. A single variable, the body weight or a skinfold or some other criterion, such as height, has the advantage of utmost simplicity.

We know *something* about the population for which we can say that the percentage of children classified as "malnourished" in 1970 is so much and in 1980 or the year 2000 is so much, even when we define "malnutrition" simply as the child's failure to reach or exceed a critical level of the given variable, such as two-thirds of the standard weight for age and sex.

A single variable provides, clearly, extremely *limited* information about the human physique. Moreover, the use of body weight, for example, as the sole criterion of malnutrition may be seriously misleading, even when its biological significance is not confused by the presence of edema (which is frequently the case in an area of severe malnutrition).

Protein-calorie deficiency — which, on the world scale, represents the most frequent hazard to the growing child — affects both weight and height, although the effect on weight is likely to be more pronounced. Nevertheless, at times the child's weight, though much below a height-age standard, may be fully proportionate to the child's subnormal height. Under these conditions we can speak legitimately of "growth retardation" (or, if you wish, of growth depression) but not really of "malnutrition".

Matters get quickly tricky. The child retarded both in height and weight is not malnourished in the usual, clinical sense. Yet, clearly the child is not "normal".

Skinfold thicknesses may serve as indicators of the fat content of the energy stores of the body. Being within large limits independent of height, skinfold thickness is a more direct, less complex (less "controversial", if you wish) measure of nutritional status. By the same token, it cannot serve as a measure of growth retardation.

So far we have considered the situation in which the measurements will be made at successive time intervals on samples of a given population. This will yield a succession of cross-sectional portraits. The changes, if any (beyond the effects of sampling), will refer to changes in the *population.*

In addition, it might be valuable to study also the *gains* in body measurements made by a single age group, followed up perhaps over a period of a year, and to obtain sequential information on this aspect of growth.

Of potential body *measurements* there is a legion. What is an acceptable minimum? This issue has been tackled some 12 years or so ago by the Committee on Nutritional Anthropometry of the National Research Council (1956). I am not sure whether the committee has done such a good job at the time or whether the progress since has been slow. The fact remains that the committee's recommendations still look pretty good.

The measurements regarded as a minimum for the purpose of systematic field studies concern both body size and body composition. Specifically, they involve measures of body bulk (body weight, to be more specific); measures of the linear size (standing height, or in small children, body length); upper arm skinfold over the triceps as a measure of leanness-fatness; and upper-arm circumference, corrected for the subcutaneous fat, as a measure of muscularity.

These then may be regarded as the primary measurements, as primary indicators of nutritional status.

Should someone really push me hard, I would be ready to settle for three measures, statistically almost independent (uncorrelated) height (or length), a skinfold, and a fat-corrected limb circumference.

Of course, additional measurements can be suggested to define more adequately the skeletal frame and the gross composition of the body. Also, it would be useful to determine the child's skeletal age. Some investigators would consider it essential to note, in older children, the overt signs of sexual maturation. But we are concerned with a *minimum* of measurements.

While the issue of a minimum battery of measurements is not too complex and can be agreed upon fairly readily, the related issue of ages at which the measurements should be made is wide open.

The range of possibilities, of course, goes from a single, fairly narrowly defined age group to situations in which we sample the total population, at all age levels. Obviously, in the present context, the latter approach is not practically feasible. How far down can we go and still come up with meaningful data?

One can use different *criteria* for deciding this question. One criterion is accessibility. Another is vulnerability.

As regards *accessibility*, the school children are the most ideal age group. From this point of view, perhaps the age range from seven to nine would be optimal.

As regards *vulnerability* to protein-calorie deficiency, the critical age is somewhere between one and four years, and perhaps it would be this group on which we should concentrate.

As to young adults, arguments could be put forth for choosing the age range from 20 to 25 years.

If a more comprehensive age sampling were feasible — all this is doubtful — one would wish to measure very young infants (perhaps from 6 to 12 months); older children (at two age levels, which would differ somewhat for boys and girls — boys from 12 to 13 and from 18 to 19; girls from 10 to 11 and 16 to 17), and also older adults, beyond the age of 25 (perhaps from 25 to 40 years of age).

In *summary*, I have considered the study of human physique with reference to a simple question: Can we use information on growth rates, on body size and body composition of selected age groups as the criterion of long-term trends in the nutritional status of the world's populations?

The answer is, in principle, yes. But to obtain the required factual data will be difficult at best.

Yet, the challenge is very real, provided we can lift our eyes and appreciate the full magnitude of the problem posed by the steadily growing disproportion between the amount of food produced and the number of stomachs to be filled.

While I was concerned with the international scene, with special reference to the developing countries, good purposes would be served by studying selected subsamples of populations of countries which on the whole are technologically advanced, including these United States.

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FRANK FALKNER, M.D.

Stanley Garn has said, "Studies on growth should — like growth itself — be fully international in scope." I would add: "international and multidisciplinary."

Certain countries, particularly the underdeveloped nations, feel a need to develop their own standards of development and thus must produce reliable norms from cross-sectional, longitudinal, or mixed data. This means they need to continue with the classical anthropometric and developmental methods of producing such data. These norms are useful descriptively. A child from any given race and environment may be found comparatively big or small, advanced or retarded in psychomotor development, or fast or slow in skeletal maturation. But such norms do not qualify in any absolute sense. Hence the need for international and multi-disciplinary approach which will allow evaluation. Human biologists need now to be thinking of, and turning to, dark and unexplored corridors in this field.

Why does an animal grow? How does he grow? What controls growth? Why does growth in size in the human animal reach a plateau at 20 years of age?

The control mechanisms at play are based upon suitable environment. Yet it is extraordinarily hard to deflect the growth curve. With severe assaults, such as malnutrition or hormonal deficiencies, the child will fall away from his individual curve. Return him to optimal or near-optimal conditions, and very often his growth will "catch-up" to the curve and, indeed, as if to make up for the deficiency in growth, will usually shoot above the curve before finally falling back, aimed again towards the main target.

The correlation between birth size and adult size is very low but the correlation between current and ultimate size increases until, in healthy populations, by two or three years of age predictability is high. Accordingly, the variability of adult size, assuming good environment until maturity is reached, appears to be stabilized at this young age.

Since full term newborns vary comparatively little in size, how does the baby destined to be a genetically tall adult get onto his curve at two to three years? If he is a small newborn destined to be a large adult, he exhibits "catch-up", of course, and grows faster than average, making up most of the difference by six months of age. Hence, the range of body weight in studied healthy populations is not as wide at six months of age as at other ages.

There is certainly a control mechanism at work here, since by no means all small babies exhibit catch-up. Those that are destined to be healthy but genetically small adults do not. Their growth is aimed at their genetic target, shall we say, of smallness.

The fundamental question is: What keeps the growth of the normal human on its target curve? If growth is deflected from it, what brings it back to it — if and when the child returns to a good environment, for instance?

And then most important, what stops the catch-up process when the compensatory phase has been successfully completed?

Perhaps some of the most frustrating and needed areas of study in human development lie in utero. We cannot measure gestational age infallibly. We cannot enter the healthy pregnant uterus to measure our fetuses. We have no true antenatal fetal norms.

How wise are the Chinese! At birth a newborn celebrates his first birthday and is one year old. More and more we must turn to the prenatal period to determine irreversibly laid down growth patterns — healthy and abnormal — desirable or undesirable — including those which may result from congenital malformations or in their creation.

Studies of monozygotic and dizygotic twins are of great help in estimating and weighing relative importance of genetic and environmental influences. The placenta is a monument to some aspects of prenatal life; its importance in the etiology of low birthweight babies and the damaged neonate needs further evaluation.

Nutritional factors, like growth, presumably start to operate immediately after conception. Malnutrition in utero is just as important as malnutrition in Guatemala. In both places there is a real need for truly multi-disciplinary research to determine the place of nutrition in human development.

Aging and early human development are intimately related. Both processes start at conception. The ultimate understanding of both implies, alas, the prospective, longitudinal approach, with the study of many parameters — "alas", because while there is no other satisfactory method, this approach is fraught with difficulty, frustration and expense.

The cross-overs, interactions, complex related chains of parameters responsible for determining the myriad patterns of development in a single human from conception to death become a potential nightmare. We are tormented by such questions as whether the geneticist is the proper scientist to explore the control of growth. Or should it be the biochemist? Does nutrition control growth? Or cognitive development? We will be allowed to awaken from this nightmare to the calm light of dawn — however much our cold sweat may discourage us — only when scientists will plan the specific and highly critical studies which will help us unravel in an orderly way the specific problems of the whole field. The shotgun technique of trying to measure everything at once and hoping something may turn up will never do.

We have the scientists and we have the sophisticated modern techniques.

We have a responsibility as human biologists to communicate our findings to the populations we are studying.

DISCUSSION

VICTOR C. VAUGHAN, III, M.D.: Let us ask each of our panelists: What would you do if you had the opportunity to plan a project for the next 10 to 15 years just as you would like, for the study of whatever aspects of growth you feel to be most important, in the terms in which we have been discussing it?

GARN: We know that we can stabilize growth at different levels of caloric intake. We can produce people who will be under 120 pounds as adults or well in excess of 200 pounds as adults from the same genetic stock.

Given that we can stabilize our body size at different levels of caloric intake, I think that we have got to project ourselves into the future to decide that one of the real problems will be just that — multiplying the number of stomachs relative to the material to go into the stomachs. We are going to have to investigate the situations which will allow the most growth of the most people for the fewest calories.

This is one area where we are going to have to study individuals who, for one reason or another, are on low rations. That dosen't mean they will be low in calories per kilogram, because they are going to stabilize at some level; you get about the same number of kilograms of body weight for the same caloric input whether in Guatemala or in the United States. In fact, in the Guatemalan data we have compared to our own, the caloric intake, as calories per kilogram, is slightly greater than that in the United States. But that is partially because their children are expending more energy for various reasons.

I think we have got to tackle the question of growth at low levels of caloric intake, but in a relatively affluent society and with contemporary medical care.

I think we have got to investigate the growth, the total body growth and the aging picture of our American Negro population, of which we know so little. Our present data indicate that American Negro boys are incorporating about as much calcium into their skeleton during the peak of adolescent growth as they would seem to be getting into their diets. This assumes a degree of availability and degree of efficiency in passing calcium through the gut that is beyond reasonable expectancy.

I think we only have to look about us to see the kind of problems that we have got to address ourselves to, recognizing that in the past we had only one objective and that we learned from animal husbandry: to produce the biggest animal in the fastest period of time, as if you were going to sell him at the supermarket.

Now we recognize the fact that the child is the father of the man; these relationships have to be pursued.

CHEEK: I am very interested in this problem of overnutrition. As you are aware, there are abundant data in the literature now demonstrating the different phases of liberation of hormones after protein meals or after ordinary meals: first, the insulin stage, then the growth hormone/insulin stage, and then the growth hormone stage.

The dietary intakes of protein and of carbohydrate, through central nervous system or other mechanisms, modify the release of these important hormones. One wonders whether or how these hormones participate in multiplication of cells, growth in cell size, and so on.

Are we programmed early, with excessive dietary intake arising from habit, genetics or other factors, to produce excess hormone liberation? Does excess dietary intake in early life program a somewhat aberrant release of these hormones which sets us on differential paths of growth?

I think this is a very important question, because one begins to see a whole cycle of events opening up. I would like to pursue and find out about whether or not such programming early in life could be operative.

The second area of interest to me is the intrauterine period. Our work over the last five years suggests very strongly to me that most of the problems of severe growth retardation in children arise from intrauterine influences.

There is an appalling lack of knowledge of the growth of the brain *in utero.* Brain development departs from somatic development as a whole, the two following different time scales. I think that the pursuit of understanding of the brain particularly and of other tissues *in utero* may help greatly our understanding of the problems of growth retardation.

Growth retardation in children with congenital heart disease, in whom most of the damage occurs very early in life, and the effect of viruses on cellular growth are also important fields requiring study.

A propos of the brain, I am reminded that Samuel Fomon justifiably took issue with me as to whether the overcrowded litter is a deleterious situation. However, I would respectfully point out that it has been shown at Stanford that with overcrowding taken to excess, there is interference with phospholipid deposition in the brain. You end up with a stupid rat. You may live longer, but you may be splitting hairs. I think what we are saying is that moderate restriction is not necessarily very deleterious, and he's right in that.

FOMON: I don't have any trouble outlining a program for ten years. I think that in the area of understanding of growth during early infancy and in the prenatal period there is more than ten years of work.

Dr. Jack Filer and I share a program oriented toward gaining an understanding of growth in the normal individual and examining factors that influence growth. To return to the three ways in which Dr. Brožek says that you can make advances in an area — methodologic, theoretic or applied — I would say that we were going to restrict ourselves to the first two in the next ten years. We are going to study the body composition of an animal prototype which we hope adequately represents the human condition. We are using the miniature pig. We are going to make both direct and indirect measurements of body composition in this animal, with various interventions.

We are also working with the normal human subject. Here we use indirect methods. We are very eager to improve our indirect methods of measurements. And we are working with the stillborn fetus, so that we have a human subject on whom we can do both some of our indirect measurements — for example, potassium 40 whole body counting — and direct chemical analysis.

BROŽEK: Ten years! What a short period of time! I am much more worried about the next hundred years.

The issue that I have been discussing — the changes in the nutritional status of the world's population — is a very serious problem. In regard to research, there are two issues that to me appear especially intriguing and urgent.

The first one is the issue of optima. What are the optima in terms of growth, rate of growth? What are the optima in terms of tissue composition?

We know really next to nothing about what we could call the harmony of tissues. We are still very far from having dependable knowledge regarding the relationship between growth rates in man and the subsequent health, resistance to disease, performance capacity, or longevity; and yet it is these functional criteria which in the end are the important ones. Not how many pounds babies are, or adults are, but what is their fitness as described in this broad sense?

At the present time we know next to nothing about these issues — when tissue harmony is present, or what specifically are the advantages and penalties of deviating from a norm in a given direction by a given amount.

I feel that we can hardly over-emphasize the importance of the exploration of the relationships between somatic structure, including body composition, and body functions in the broadest sense.

VAUGHAN: Are there any instructions from the audience for this panel as they set about their next ten years' business?

RICHARD L. DAY: No instructions, but I would like to have a couple of points that were touched on by several of the speakers amplified a little bit.

What is the current state of knowledge about mental capacity in relationship to protein deprivation early in life?

Secondly, what is the current speculation with reference to the difference in the catch-up growth according to when the growth deprivation occurs?

Dr. Fomon hinted he thought that this had to do with whether the stage of replication of body cells had been completed or not, that if the deprivation occurred before this, the catch-up was less or non-existent, whereas if it occurred after this point catch-up growth was more effective. Is my interpretation of this correct?

Thirdly, what can be said with reference to nutrition in the early years and myelination?

You said you don't have data, Dr. Cheek, on the number of cells in the fetal brain at different points, but what about the state of myelination with reference to nutrition, the permanence of the deficits in myelination and their relation to mental growth.

FOMON: I think it is entirely possible that different members of the panel will answer the first two points somewhat differently.

Dr. Day asks: What do we know about the permanent effect of early nutritional deprivation on mental capacity?

In the human I think we surely do not know what the relationship is. The convincing experiment has never been done in which a child who was severely malnourished during early infancy or during the post-weaning period was shown as a result to be deficient in certain mental testing procedures. Impaired children exist after malnutrition but such children have never been given a really full diet for a prolonged period of time in the adequate environmental surroundings that permit a reasonable answer to the question.

DAY: Don't the data on twins bear on this?

GARN: They don't. We have had a chance at the Fels Institute to study with Dr. Meinhard Robinow a few children who had extremely low birthweights owing to extremely small placentas, but who were developmentally reasonably mature.

These now 15-pound, two-year-olds don't seem to be as retarded by conventional test measures as you might expect. Certainly they don't have delays in the Gesell parameters comparable to those reported by Cravioto and others in extreme protein-calorie malnutrition.

It is true that in the smaller twin at birth there is a runt effect: the smaller twin at birth often but not invariably tends to be the smaller individual throughout. I have seen some evidence that this may be true in the behavioral area, too.

But twins are not normal people, especially when they are reared in a restricted environment that consists of themselves and not the rest of the world.

Now, I think Dr. Canosa may want to add some more things about studies of Central America.

CIPRIANO A. CANOSA: We are trying to do just what Dr. Fomon suggested. We are working in very small communities, where we match communities for malnutrition. Protein-caloric malnutrition is very prevalent. It is very preliminary, but it appears that the placentas of the malnourished mothers are quite different from the placentas of well fed American mothers in protein content. In our growth studies we try to make the only variable the nutritional status, with supplementation given to the children to cover at least 120 to 150 percent of their requirements in proteins and calories, in order to compensate mainly for disease.

This work has been in progress now for the last three years, and we have three variables. The first, the individual state of nutrition; the third is mental development; and we have the intermediate variable, the socio-cultural status. We can measure the first and the third, not the second. The intermediate variable we will have to control.

Remember when the school child was the star of our studies, then the pre-school child. Now we are talking about intrauterine development, and prenatal studies. So we will have some problems to work on.

VAUGHAN: Dr. Canosa, would you comment on the relationship between your second and third variables, the measurements of intellectual function and the socio-cultural status? How much is it a difficulty in your work that it is hard to find a test for intellectual function which is free of cultural factors and of socioeconomic differentiation?

CANOSA: When we began, we had nothing to start with, so we had to find out if the available methods of Gesell, Cattell, Bayley, and Merrill-Palmer would work for children from one to three years. The final psychological test I think we will come up with in maybe two or three months, with techniques worked out in field conditions after pre-testing 2,000 children.

We are now able in field conditions to measure the sociocultural status and to compare sociocultural status with mental performance. And we must tell you that there is an obvious relationship between those communities' sociocultural status and mental performance, as in physical growth.

BROŽEK: Actually, the issue of the culture-free test is not so important. You are not necessarily concerned with the culture-free test, but with the tests you are utilizing you must operate in communities in which the cultural backup will be identical. So this is perhaps not as crucial as it might seem on an absolute basis, because I do not believe that outside of purely neurophysical functions you can ever get a behavioral test which is culture-free.

What you have to do is control those aspects of the environment which might affect it.

GARN: I would like to comment once more about the brain. Roy Brown found that brain weights were deficient in the progeny of families with protein malnutrition. The question before us has been whether his finding, which is unquestioned, really means that brain growth fails even in the prenatal period, as the information on the placentas would suggest, or whether his data were indicative of a loss of brain weight, which was then contrary to established belief but was in essence what we had shown for skeletal mass.

When we first found that the skeletons of children with kwashiorkor were smaller in mass than those of children many years younger, the logical explanation was that they hadn't grown on the inside. But when we were able to find children being treated in the hospital for the disease who were still dumping bone, then it was clear what had happened.

So we still have to find out how much is happening in terms of retarded brain growth from the prenatal period on, and to what extent the gross weight of the brain is affected in the course of kwashiorkor, where it may lose as much as 20 percent or more.

BROŽEK: You might want to look not only at gross weight but at what that weight represents, which is a different but related important issue.

GARN: Could I ask the audience a question? The word "optimum" has come up repeatedly and always does in gross nutritional studies.

Now, in animal husbandry and in animal nutrition in general you can define "optimum" for fleshing. If your job is to produce beefsteaks, you can develop a dietary that will produce the most beefsteaks for the fewest calories. If your optimum is egg production, you can develop a dietary that is suitable for this optimum.

If your optimum is producing poultry breasts, you can work out a feed that has maximum efficiency. You can do it for milk production. You can do it for activity.

And there are feeding techniques that have been developed for racehorses.

You can possibly do it, it seems, for longevity, though that is not normally the problem in animal husbandry.

But when we come to human beings and talk about optimum growth and optimum development, what do we mean by "optimum"?

If you tell us, I think we can develop dietaries or even breed people for the purpose. But until this word "optimum", which is a nice word supercharged with all kinds of semantic goldplating, is defined for us, we are still a little bit stuck.

BROŽEK: May I answer this please? It is not "optimum" but "optima". You may want a population of six-footers who can play basketball, or to breed for mathematicians.

There are two points, really. First, there is no optimum, but optima. Secondly, the criteria must be performance, functionally defined fitness, in whatever way you wish to stress the desirable characteristics.

FOMON: Well, that is a little bit too simple. We can't yet really give a working definition, but we know what the elements of a theoretic definition are. One is health. So it isn't only performance unless you mean physical.

BROŽEK: Health is a part of what I am talking about.

FOMON: Okay. State of health. The speed of development with respect to the learning process, if you want to put it as broadly as that. And the preservation for as long as possible of a productive, effective life. We don't want to extend senility, but to have a vigorous maturity that is prolonged.

Theoretically, we can define the optima but aren't anywhere near a working definition yet.

QUESTION: In this respect, Dr. Cheek's and Dr. Fomon's slight disagreement over increased longevity versus increased intelligence might be pertinent.

FOMON: I don't think we have a disagreement. I don't accept that the increased longevity is necessarily at the expense of decreased intelligence. If it is at the expense of decreased intelligence, then I will vote for whatever gives us intelligence with a shortened lifespan. But I don't think those two are necessarily related.

BROŽEK: Furthermore, we can find out if we wish to do so. But we have not been doing it because the nutritional hand was proceeding too frequently without knowing what the right functional or psychological, neurophysiological hand was doing.

This is one of the very important issues — that you must look both at the differences in growth rate and body composition and at what their meaning is to the degree that it can be assessed — objectively, quantitatively, and in terms of functions.

PART III SOCIALIZATION IN EARLY CHILDHOOD

Papers by

Albert Solnit, M.D., Child Study Center, Yale University
Reginald S. Lourie, M.D., George Washington University School of Medicine
Lawrence Kohlberg, Ph.D., Department of Psychology, University of Chicago
Harold B. Gerard, Ph.D., Department of Psychology, University of California

Respondents

Frank Garfunkel, Ed.D., Boston University School of Education
Calvin F. Settlage, M.D., Mount Zion Hospital and Medical Center, San Francisco
William J. Meyer, Ph.D., Department of Psychology, Syracuse University

Albert Solnit introduces discussion of socialization with a predominantly psychoanalytical interpretation, and reviews "failure to thrive" and "accidental" poisonings of infants and young children as possible indicators of failures in socialization. Reginald Lourie amplifies the theme, with particular attention to pica as a sympton of impaired socialization. Lawrence Kohlberg shares the implications as to what to do but suggests a different theoretical structure for socialization, asking whether or to what extent a social thrust may be innate in infant and child. Harold Gerard and others reveal some problems of children of minority groups.

FAILURE TO SOCIALIZE IN EARLY CHILDHOOD Albert J. Solnit, M.D.

Introduction

"Man being as grass, to wither under the scythe . . ."

Ecclesiastes, Old Testament

"I am a humanist. In other words, I still maintain a belief in the autonomy of the individual and that the individual can make some impact on the world."

Rolf Hochmuth, The New York Times Magazine
November 19, 1967, p.48.

"The humanness of man is not innate; it is a product of socialization. Some of the peculiarly 'human' traits disappear under conditions of extreme crowding, probably because man achieves his humanness only through the socializing effect of a truly human group in order to become and remain human."

"The human species probably became adapted through evolution of social life in small groups where each member knew each of the others personally, perhaps having a need for larger social gatherings from time to time but certainly not too often. Now and then, furthermore, man needs to be by himself or at most with a few intimate associates. Buddha, Lao Tzu, Christ, and all the great creators after them have searched solitude to discover themselves and their mission. Man reacts to continued oversocialization with all sorts of frustrations, repressions, aggressions and fears that may develop into genuine neuroses."

René J. Dubos, "Biological Remembrance of Things Past."
Bulletin of the Philadelphia Association for Psychoanalysis,
Vol. 17, No. 3, pp. 141-142, Sept. 1967.

Social Development

In his social development the child proceeds from the newborn period to the first evidence of social reactiveness in his responsive smile at the age of 4 to 8 weeks. Before that, the capacity to express needs and to give evidence of pleasure or gratification can be viewed as under the influence of the pleasure principle and as a forerunner of social development. However, in the past the failure to experience this first preparatory step towards socialization — a physical-psychological phenomenon — has led in severe cases to death through the development of marasmus. This was seen in institutionalized infants in the pre-antibiotic era (Ribble and Spitz) and apparently was in part due to a lack of resistance to the ordinary flora of microbiological organisms. Since the advent of antibiotics, these severely deprived institutionalized children survive, but they appear pale, doughy and ghost-like, suggesting that they have become a colorless, somewhat inert part of their environment. They do not appear to be children who shape their environment as well as being shaped by it.

Psychoanalytically, social development in the first year of life can be conceptualized in terms of the baby-centered experiences that enable the child to expect relief and satisfaction from what can be termed the need-satisfying mother in the first weeks of life. Gradually this relationship becomes refined, and the mother is experienced as a specific entity for the baby just as the baby has become increasingly specific for the mother.

In the second half of the first year of life we speak of the change from a need-satisfying characterization to the characterization of constancy of the particular mother for the particular child. In this stage of socialization the child has developed sufficient mental resources to maintain a positive mental image of the mother as a living object that both provides love and becomes the object of the child's love and expectations — the primary love object.

In this condensed formulation of one line of development (Anna Freud), there is a mutual adaptation of mother and child (Erikson) which is the basis for the social development of the baby and the basis for an elaboration of the mother's psychosocial capacities as she invests her energies and her hopes in her son or daughter.

In the second, third and fourth years of life, the child's increasing physical and mental resources enable him to explore his social world physically and verbally. He can also adapt to his social world with increasing autonomy and industriousness through an elaboration of capacities to defer the immediate satisfaction of his impulsive urges or wishes, developing a repertoire of substitutive activities and gratifications. These substitute activities and satisfactions are detours that enable him to tame the demands of his impulses as well as to achieve partial gratifications that are socially acceptable and that in fact promote social development. This process can be seen in situations where a child waits, despite his hunger, to eat with his family, or he paints and draws as a way of warding off the urge to make a mess in his pants or more generally to mess up his social environment. At the same time, as he modifies his urge, he achieves a partial gratification of his impulsive wish and the approval of his parents for his "artistic" activities.

Through his developing capacities to defer the demands of the instinctual drives, to transform them, and to accept partial and substitute gratifications, the older child is assured of sound social capacities and satisfactions. By being able to defer and transform clinging, attacking, dominating, torturing impulses into persistence in personal relationships, into empathic awareness of the interests of others, and into tenderness and the mastery of physical and mental problems, the child acquires the ability to relate socially and to persist in the face of adversity in efforts to change or control the inanimate environment. Thus, socializing is the bedrock out of which civilizing influences emerge. If there is balance in efforts to find satisfactions for oneself and to adapt to one's social situation, then the child can become the adult who works productively and establishes satisfactory personal and social relationships. This concept of mental health is based on the assumption that what the child experiences passively (e.g., being fed or bathed) he eventually can become active and responsible in conducting (e.g., he feeds and bathes himself), providing the passive experience was gratifying and conducted in the atmosphere of social expectations. That is, the mother not only enables the child to enjoy the feeding and bathing, but she expects to have the satisfaction of enabling the child to become independent of her, as his developing capacities permit him to respond with pleasure and confidence to the mother's encouragement. The social context in which passive-to-active development takes place is crucial in facilitating or discouraging the healthy balance between the individual's adaptation to his social realities and the effectiveness with which he works to change the social fabric of his community in order to provide improved conditions for his children and neighbors according to his own social values.

The above summary of social development has leaped from considering young children to formulating the goals of adult development. For the purposes of this presentation we cannot be comprehensive. As a necessary step in preparing to join his peers in attending kindergarten, the child must resolve the conflicts associated with his intense romantic possessive feelings toward the parent of the opposite sex and his jealousy of and rivalry with the parent of the same sex. His first sustained contact with his community begins in many instances with going to school or to kindergarten.

Education that begins with pre-kindergarten schools is increasingly accepted as suitable for younger children as well as a highly desirable preparation for subsequent education and social development. The separations experienced in the pre-kindergarten schools are especially helpful in assisting the child to exercise his capacities to identify with his parents while he functions as a member of a group in which they are not present and in which a teacher is the guiding, protecting adult. Through repeated experiences with his parents and siblings, the child, internalizing his experiences, has taken over for his own use many of their attitudes and mental images. Prior social relationships in the family enable the child to form new relationships in a selective and discriminating manner.

In this context of opportunities to develop interests in contemporaries and community groups, aided by the gradual subservience of the tyrannical or compelling demands of his impulses and instinctual drives, the child gradually begins to develop impersonal ideals and values of his own. He views the teacher, school and class as uniquely related to himself and he invests himself in learning about a larger social context through the use of symbolic communications which his progressive development has enabled him to master. In this period, social meaning and values are implicit in the cognitive as well as in the play and social activities of the school. Thought becomes a trial of action. Such mental activity appears in many forms, including phantasy, memory or planning (anticipatory thinking), and enlarges and enriches the contact with the social as well as the physical world.

In preparation for becoming an adult, the pre-adolescent figuratively takes a lingering look at the past. Before the die is cast biologically, psychologically and socially, the child in pubertal crisis often demonstrates his nostalgia by regressing. He retreats to an earlier position of dependency and appetitive expression as he mobilizes to enter into the powerfully dynamic phases of full adolescence. Social development appears to be askew as his standards of social behavior are temporarily relaxed. He experiments with lying, stealing, messy behavior, over-eating and passivity, as he prepares to rebel and to explore life and the world in a bold and experimental manner.

Failure to Socialize — The Children

In many studies of children and their parents, socialization is often taken for granted as an implicit dimension of the investigation. When socialization is untroubled, it is silent, becoming audible only where it is troubled or conflicted. Our studies of children who fail to thrive despite the absence of detectable organic abnormalities suggest that a major factor in the failure of growth is the mother's inability to socialize her relationships with the young child. Viewed on a continuum in which child and maternal development are assumed to parallel each other, the failure of the mother's development can be the essential cause of the child's failure to grow and develop according to expected norms.

Clinical observations suggest that the child's failure to thrive stems from apparently extreme opposite causes. In the one instance the mother or maternal figure tends to utilize the child as the basis for her own sexual and aggressive gratification. The child's normative characteristics and behavior are perceived as stimuli that evoke the adult's reactions of unmodified impulsive behavior. It is the children of these mothers who are most often physically abused. Their condition represents the outcome of a situation in which the young child becomes the object through whom the parental persons derive direct gratification of poorly modified sadistic impulses that have become unbridled in response to the young child's stimulating behavior and helplessness. Many of these situations are instances in which psychotic parents are released from the psychiatric hospital under the influence of tranquillizers which permit them to be sustained outside of the hospital but not to be able to cope with their children's needs.

In the second instance, the child is neglected or understimulated and under-gratified. In these situations, the mother's inability to activate the child's development reflects her own depressive or depleted state. These mothers are in need of being nurtured, of being mothered before they can provide their child with the maternal stimulation and responsiveness, the crucial stimulation and organizing influences that are essential conditions for vigorous development in childhood. When the mother's psychic (and often physical) energies are depleted, the investment of interest in the child and his behavior is deficient.

Both of these extreme conditions or their combination require sustained interventions if the children are to be protected from the permanently corrosive effects of such experiences, and if the mothers are to be assisted in caring for their children and in advancing their own development.

In this report, early socialization has been viewed as a complex developmental phenomenon, based on a relationship of the child to the mother that promotes his capacity to postpone impulsive behavior and to accept substitutes for the original gratifications. In our studies of children who failed to thrive due to understimulation and neglect, socialization often appears as a restitutive phenomenon presenting a paradox of bewildering proportions. These phenomena were observed in children recovering from relative maternal deprivation in the home, and in those who were placed in a foster home after living in an institution. As the individual child recovered from the disadvantage of understimulation, his pathway to recovery, especially with respect to the reactions of increased social responsiveness, was often misinterpreted as undesirable wildness. The child "coming alive", as his drives were awakened by affection and a responsive environment, was often reacted to by parents and foster parents as unacceptable, undesirable and rejecting of the adults.

We have assumed that this "coming alive" or activation of dormant and often stunted drive capacities produces a disharmony or dysynchronization of impulsive energies and regulative capacities in the individual child. Viewed in this way, the deprived child's drives and his capacities to transform, channel or ward off the pressures and demands of the drive energies are out of phase. Ironically, just as these children begin to respond, to "come alive", the (foster) parents often feel overwhelmed by their behavior, which is misperceived as a lack of grace and gratitude as well as rejection. The foster parents, feeling let down, often bitterly invoke the expectation of the bad seed in these children whose background often represents unacceptable social values for these parents.

In their follow-up study of institutionalized children placed in foster homes, *Infants in Institutions*, Provence and Lipton state, "As time passed the beneficial influence of maternal care, family life, and the enrichment of experience in many areas was increasingly manifest in all aspects of development. The children became more lively, more active, began to learn to play, and to solve everyday problems. They increasingly made relationships with each other. In addition, there were signs of improvement that were not always universally recognized by the parents as signs of growth: they began to show some provocative, negativistic and aggressive behavior. This was a time of crisis for some of the parents and children. If the parents saw this behavior as bad or as indicating that they were failing as parents or if they felt rejected by the child, some either gave up in actuality and asked that the child be removed from the home, or withdrew some of the emotional investment and interest that were so important to his improvement. Others realized that such behavior was a necessary step in the child's progress and were able to react to it in a helpful way."

Socializing is a broad concept. It deals with people living together, forming a unit in which the whole is greater than the sum of the parts, embracing considerations as widely separated as social values and biological adaptation. The infant will die or suffer severe developmental impairments if the mother does not feed, stimulate and protect him in the context of affectionate expectations. Emotional deficiency, as in institutionalization, can and often does lead to nutritional deficiency and failure to grow, with permanent residual impairments to physical, social, mental and emotional capacities. The earliest observation of this fact is recorded in the famous experiment in education by Emperor Frederick the Second in the 15th century. Curious about what language a child would first speak if he were untaught — the classic languages Latin, Greek, Hebrew or his own mother tongue, the Emperor instructed the nurses of newborn homeless babies to provide all necessary physical care but never to speak to the children or show any signs of affection. The infants all died at an early age and the Emperor stated that they could not live without the demonstrated affection and friendliness of their nurses.

Modern studies by Ribble, Spitz, Goldfarb and Provence have documented and refined these findings. These studies and others (Provence and Coleman; Leonard, Rhymes and Solnit) have clearly indicated that the impact of institutionalization is not an all or none condition. Children raised in disadvantaged families and those raised by depressed or severely constricted parents can also suffer from maternal deprivation.

Failure to Socialize — The Mother

In our studies of young children who failed to thrive despite the absence of organic disease or deficits we have traced the issues to the vulnerability of the child, the failure of the depleted mother to have ample supplies of affection for her child and the failure of the family and community to provide the personal interest, assistance and protection for the mother and her child. One can also include in this consideration the failure of adults to agree effectively about what kind of social world we are aiming to prepare a child to enter as an adolescent and adult citizen.

In our studies of infants we became aware that the most critical factor in evoking failure to thrive, a reproach to our society, can be described in terms of the mother's failure to thrive. Our investigation led us to the following formulation.

Maternal or motherly feeling does not always immediately accompany biologic motherhood. Motherhood is an unfolding developmental phase which is activated by pregnancy and the birth of a child. The adequacy of this developmental response is multiply determined by the mother's previous experiences as well as by the physical, psychological and emotional resources available to the mother during the successive phases of motherhood. The number of children the mother has borne and cared for, as well as the support she received from her husband, grandparents, other relatives and friends, can nuture or deplete the mother's supplies of affectionate energies and her tolerances of frustration and conflict.

Of course, the mother and infant are reciprocally and progressively influenced by each other's actions and attitudes. Thus, developmental characteristics of the infant which can initiate difficulties in the mutual socialization of mother and child often cannot be clearly separated from those difficulties caused originally by what can be termed a mother-child conflict.

Maternal development is influenced by and dependent on a host of cultural, physical and psychological considerations. Included among these factors are the quality and quantity of nurturing experiences the mother received in her own infancy and childhood, and the continuation of maturing and satisfying relationships with her husband and others on whom she depends for closeness and emotional support. With the birth of each child, maternal feelings emerge as the mother is able to supply the needs of her dependent infant in a satisfying way and in turn to be gratified by his increasing responsiveness to her. Adequate development in motherhood is experienced by a woman as a sense of self-fulfillment in her activities as a mother. Through mothering her child competently and with satisfaction she can sublimate her instinctual drives in a uniquely creative way, preparing herself to adapt to the child as he responds to her affectionate demands through his emerging developmental needs and capacities.

The experiences of mothering successive children are critical influences in shaping the mother's personality. When mothering experiences are altered by stressful or traumatic life situations, considerable inner strength and environmental support are needed if a mother is to maintain an adaptive equilibrium.

In our studies of infants who fail to thrive the mothers were depleted, overwhelmed and deprived. In some instances these deficits were discernable in women who had retained infantile personality characteristics and for whom the first child's needs and behavior depleted the scanty resources available to them before they became pregnant. Many of the mothers whom we evaluated and assisted in this clinical action-research had such cumulative handicaps as: inadequate or insufficient mothering themselves; minimal or no support from husbands; several children born in rapid succession, with the last one representing a magnified expression of the cumulative depletion of their physical, emotional and mental resources.

Many of these mothers represented the second or third generation of a family who were poor, disadvantaged, disorganized and living in a slum community. These women were failing to thrive in their own development. They found it a painful or impossible demand to respond to their baby's manifest needs and behavior. They described their despair, frustration and anger at having to care for a child whose failure to grow and develop further undermined their own sense of worthlessness and inadequacies. In this context each infant and mother reciprocally contributed to the other's failure to thrive, an instance of mutual maladaptation.

Often these families lived under crowded housing conditions which also contributed to the inadequate or deviant relationships in these social units. Perhaps this condition is what René Dubos was referring to when he recently spoke of oversocialization as a source of frustrations, repressions, aggressions and fears that contribute to neurotic development in our society.

Socialization — A Cry for Help

In another study of children who accidentally ingested poison the failure of the mother's love and guidance to protect these children from the dangers of the household was evident. What was not so evident was the inference that could be drawn about the meaning of the act of ingesting the poison to the child. In a large number of instances it could be demonstrated in play interview observations and in home visits that the child was attempting to compensate for the lack of organization and affectionate guidance and stimulation in the home by offering his own brand of stimulation and socialization.

These children ranged in age from 1 to 4 years. Although the psychological meaning of the act of ingesting the poison differed according to the developmental capacities of and tasks confronting the child, there was a remarkable consistency in the fact that such behavior was reacted to by the adults as a sign of danger. From society's point of view these children conveyed an urgent request or demand for help which they initiated by an act that rapidly brought about a social and socializing response. In a sense the child's provocative behavior is a misuse of the motive to socialize. However, the longing for social contact with the mother, especially in the children from 18 to 30 months of age, usually was based on prior satisfactory social, physical and emotional experiences with the mother. Although dangerous and inappropriate, this "accidental" act was an effort to reestablish what had been satisfying and supportive in the past. The mothers of these children appeared to feel acutely depleted often in association with the birth of another child or with the loss of a key supportive adult through divorce, death or military service. These mothers were described as depressed, disorganized and lonely, and with few recreational outlets or social contacts with friends, neighbors or community organizations available to them. The poison ingestion could be seen as a dramatic effort on the part of the child to bring about a closeness between himself and his mother in a household that reflected the depressed or disorganized state of the mother's resources.

In one instance depression and lassitude in a young mother resulted in open access to a bathroom in which the mother spent a great deal of time with cosmetics and cleansing activities in an effort to bolster her sagging morale. As she lay on her bed the 16-month-old boy on three separate occasions, after attempting to arouse his mother's interest, went into the bathroom and ingested a toilet bowl deodorant, cold cream and other cosmetics for which he required medical attention. It may, therefore, be productive to assume that the child's particular reactions, social and otherwise, to his mother's state of depletion will be determined by his own tolerances, vulnerabilities and developmental characteristics at the time her depleted condition has its impact, and according to the duration of that impact as well as its variations.

Social Issues and Socialization

We must ask, how can we reorganize our society — our social patterns, in the light of our increased knowledge about molecular and cellular development, of our increased awareness of how cells, whole organs and complete human beings are related within the organism and in response to the physical and social environment? How can this increased knowledge and our advanced technologies of communication, transportation, earthmoving powers (constructive and destructive), and space-exploring capacities be combined with our primitive or undeveloped social regulation in a promising and productive manner?

In view of the focus of this presentation, which has been the social development of the young child in an urbanized family in our Western Judeo-Christian civilization, the larger issue may be stated as, "How can the family, especially the parents, be provided with the continuity of affectionate *community resources* and opportunities that will enable them to become active in restoring themselves when they have failed to thrive? How can the family select the viable alternatives they prefer for the future social development of their family, especially in regard to passing on to their children a set of liberating social values and the opportunities to recreate a braver, more promising community of man?"

Conclusion

In order to promote social development that is vigorous, balanced in its concern for self, family and the community and joyously responsible for future social planning we must provide children with a continuity of affection, guidance and protection. We must provide them with levels of stimulation that respect their individual and collective tolerances with opportunities for expressive behavior and social experiences. We must enable them to live their lives in a humane community rather than to be lived by their drives or submerged by their society.

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PICA AS A DISTURBANCE IN SOCIALIZATION Reginald S. Lourie, M.D.

As we look at socialization both from theoretical and from observational and clinical points of view, it appears in its basic components to be built into the organism from its beginnings. It is a drive for closeness, to be part of another.

Even where we see the conditions that produce distortions in socialization, this drive never really seems to get lost, because if it is not available in the forms that we prescribe, that will end up as humanness, the individual looks for other forms of socialization or closeness.

If nothing else is available, the child turns to the environment, or even to itself and will socialize, if this isn't too great a distortion of the term, even with parts of its own body if people are not available or if people are too dangerous.

Socialization is important as an organizing force within the organism, and as such an organizing force it involves the use of other people, the experience of other people, the interaction of other people as part of a learning process that helps determine what picture the individual has of himself in relation to other people.

Now, when people are not available or when there are handicaps or hazards to what we think of as the good solutions in the development of socialization, the individual will find other ways.

As we watch babies in our infant-rearing studies, where they are in relatively deprived boarding situations, we find that if they do not have people with whom to be close by touch, they will find ways of contacting them that are not tactile. They will contact them with their eyes. A visual relatedness develops.

The "hand-to-mouth" stage,which we hope comes and worry about if it does not, is the phase in which the child is beginning to relate to his environment, to experiment with socializing with things. There are some children, of course, who never get past this.

When socialization with another person does not occur, it is one of the most anxiety-producing phenomena that we encounter in childhood. When you find an unrelated child, you will find an anxious mother.

There is nothing that gets people as anxious as the schizophrenic or autistic child, when demands are made or opportunities created for relatedness which are turned down. Not infrequently as we watch the autistic, schizophrenic child in his relationship with his mother at two, three, or five years of age, it appears on the surface this is a rejecting mother. But if we look back, we may find that this was really a rejected mother, who poured herself out to this child for months, and finally reached a point at which her tolerance for the child's rejection was exhausted and at which she herself then turned away.

When conditions are not appropriate for socialization, the child has an infinite variety of solutions. The intensity of the drive, of the need for socialization, is revealed in the experience of Anna Freud and Dorothy Burlingham in the nurseries they established during the London Blitz, where there was not enough mothering available.

As they have reported, among infants and children, when there is not enough mothering available, there are some babies who are smart enough, aggressive enough, or tuned in enough to find out what kind of behavior would make them the favorites and would attract to them the scarce mothering attention available.

Another group of children, not really defeated under those circumstances, who could not find closeness and becoming part of another person through mothering figures, found that they could turn to other children, and through developing relationships and closeness with them could progress in social development.

This left only a small group that had to turn to themselves or to the environment for social contact; these were the ones, of course, really at hazard, the ones that had not enough drive to achieve interpersonal contacts.

Socialization is most important in learning. The child who has the greatest difficulty in learning is the one who is not available to the learning process. He may be alienated, aloof, mistrustful, or afraid. Learning demands other people, and the perspectives which reach outside one's self. Learning from others must include how to deal with the civilizing process, with the taming of the primitive nature of drives.

Here again we find a variety of solutions for the individual. If, for example, the child in its earliest years learns that violence and aggression are an expected part of relationships, that when you depend on another person you will be hurt, then the child may use expected hurt as a way of becoming part of another person, this expectation becoming part of the relationship picture within and later outside the family.

As we have watched battered children recover from fractures and bruises, and the like, sometimes having been brought in almost moribund, we have been struck with the way a significant segment of them — generally interested and attractive youngsters who can make a place for themselves with the adults and other children around — who, once they have recovered from the acute injury and become convalescent and are running around the ward, then become provocative, inviting others to hurt them. It has become a way of life to them, which invites the question as to how the psychology of the victim may be related to the psychology of the aggressor, as another distortion in socialization.

Child beaters as adults were not infrequently beaten children when they were young. The solution that the child has evolved for himself in the socialization process is repetitive.

Solnit referred to the child who turns to ingestion of poisons when mother is not available. I will comment briefly on studies we have done of children with pica as a symptom.

We were forced to study this, because from the inner city the children with pica were being brought in with lead poisoning. Deleading was carried out quite effectively, but the same children were coming back with more episodes of lead poisoning and more and more brain damage. We *had* to find out why the children were eating the walls and the woodwork. The common denominator in all our cases of pica was unavailable mothering. These were not young children who had turned away from other people. They still had the capacity for relatedness, still had a drive to be with and part of other people. But one of their solutions to the frustration of not having people available was the process of ingestion. We have only theories about what purpose it serves, but it does serve a purpose somehow, because it solves the relationship problem momentarily for the child. We have been amazed at the variety of bizarre substances that children have been interested in eating.

"Accidental poisonings" in children with pica do not really turn out to be accidental from this point of view. Some of these children become specialists. Their cravings involve specific substances, which most often do not contain lead. As a matter of fact, when we were looking for some support for studies we were planning to carry out on pica, we talked to the executive secretary of a foundation. After he heard us out, he said, "Say, is there any lead in brown paper bags? My three-year-old eats brown paper bags all day long."

Interestingly enough, pica is a phenomenon of children less than five years old. The need it represents is switched to some other pattern of resolution at about five years of age. Pica is one of the simplest symptoms to intervene with and have the child give up. I am delighted to confirm Solnit's experience with reaching out to the mothers. When we met their dependency needs, they could take care of the child's needs and the symptom disappeared.

Now, pica as a solution for distortions in socialization is something we should keep in mind as we look at cravings that appear in later life. Do we have the prototype here of individuals with addictions? It is under many of the same dynamic considerations, for example, that the alcoholic turns to a form of oral craving. Are we seeing, in these 18-month to four-year-old children with pica, addiction-prone individuals who will learn to solve later problems of distortions in their socialization experience by turning again to oral cravings as offering possible solutions for them?

There are critical periods in the socialization process. We find that psychologically based marasmus, or failure to thrive, begins very often at about five months of age. It is not until then that the need for socialization is felt so desperately by some children that if it is not met, they go downhill physically. Failure to thrive thus has psychologically determined aspects. Lytt Gardner has demonstrated that there may be actual changes in midbrain structure in severely deprived infants.

The next critical period in the socialization process is the phase of separation anxiety, which is at its height at about 8 months. Then there is the period at 2½ to 3½ years in which fear of bodily harm can turn children away from closeness.

What happens if critical periods are missed? We know that we can recapture some function, that we can reverse some of the distortions of the child who has turned away, or turns to the environment, or turns to himself. With treatment we can help him to be aimed back towards other people. But can he recover completely? This is a question that we still have to ask ourselves; there are grave suspicions that even though recovery can take place, it can never reach the level of development and comfort in socialization that would be possible if real needs were adequately met when the critical period was at hand.

A word about hazards. We are becoming relatively aware of the constitutional differences in babies that can pose hazards to their becoming close to or part of another person. For example, the child who is born with tactile hypersensitivity can find that pain has to be part of a relationship. Such babies may turn away from relationships at the point of discomfort. But if the drive to be related is so great that in any case the child demands tactile experiences in socialization, it can grow up then to expect that pain is part of any relationship with another person. In such individuals masochism seems to begin in the first months of life.

I think the ultimate answers that we do not now have to all of these problems are going to come from our studies of the cell. Cells in tissue culture may start as individuals, but shortly they will start to clump. Always a few cells will stay apart. Do not the cells themselves have to learn how to function together, to form organ systems and so on? What differences exist in their relatedness or their capacities to relate? What differences in their defenses?

Even in the area of behavior, when we begin to apply what we learn about the ways in which the smallest of our components functions, we may find some leads or guidelines as to how we may interpret or modify what happens to the group of cells which make up the whole child or man. I will close with this thought, that while we ordinarily describe and study behavior from the top down, as one way of understanding problems, we must also start from the bottom up.

ANOTHER VIEW OF SOCIALIZATION **Lawrence Kohlberg, Ph.D.**

While I differ rather markedly from Dr. Solnit in my theoretical orientation, when it comes to some prescriptive and practical conclusions about what should be done for the socialization of the child, I could not agree more. It may nonetheless be worthwhile to elaborate a bit the theoretical differences.

I will start with some of the value issues that are involved, because I think they are important, and then go on to some of the theoretical issues, to the kind of model of development that one might want to employ in studying the problems of socialization. Now, Solnit and Lourie have both been using the word "socialization" as a more or less good word. And I share that use. That is, when you use it as a good word, you are implying some notion of socialization more or less equivalent to social development and to certain natural trends in social development.

I myself would choose to distinguish between what most people mean by socialization and what is meant by social development or ego-development.

In the kind of research that has been built up in the area of socialization, the notion of socialization employed has been typically that defined by Irvin Child in the *Handbook od Social Psychology*, where he says something like this:

"Socialization is a process by which an infant born with behavior potentials of a very wide range learns to limit or channel this behavior into the narrower range of patterns acceptable to the group to which he belongs."

In other words, one definition of socialization is a learning of conformity to the patterns of the child's group of culture. This definition leads to a study of the processes of training the child in the behavior involved, e.g., the effects of reward, punishment, earliness of training, severity of training and opportunities for identification. This is the implication of studying socialization as a cultural transmission process.

Now, tacitly Solnit's view implies that this whole approach to socialization is limited. I agree that it has yielded very few useful results from either a practical or theoretical point of view, though I am sure many will choose to argue that conclusion with me.

I think those of us who have tried to review the literature in various areas of the effects of child-training on social behavior are aware of a welter of confusing and inconsistent results, and even when the results are reliable they explain very little of the variance. That is, we are dealing with a situation of very low levels of correlation. One is tempted to conclude that mothers and fathers really don't have any effect on children, which obviously isn't so; but that conclusion is certainly what a candid observer would reach after looking at 100 studies of child-reading practices and personality.

There are many problems in most of these studies, but I think most problems come from ignoring natural trends of development, and from ignoring the longitudinal approach to study of personality. When somebody actually does a longitudinal study of socialization he finds that the child-rearing antecedents of a behavior at age five are not the child-rearing antecedents of a behavior at age ten.

For instance, Sears, Maccoby and Whiting in various studies originally found certain child-rearing correlates of aggression at age five, but then when Sears did a follow-up study of these same children at age 12, he found that the correlates of aggression at age 12 were almost the inverse, either the inverse or simply different, from those at age five. For instance, severity of punishment for aggression correlated differently at the two ages, which is hardly surprising since the *measures* of aggression at age 12 didn't correlate at all with the *measures* of aggression at age five. You could hardly expect to find the same child-rearing correlates.

On a theoretical level, the problem is not one just of a lack of longitudinal studies. It is the lack of conceptualization of the environment in terms of inputs which may stimulate or retard natural trends of development, as opposed to conceptualization of the environment simply as a training agent.

Age-developmental studies in a variety of cultures are beginning to suggest that there are natural or regular trends of age development which are not environment-specific. And this is what is assumed, of course, by psychoanalytic theories of personality — but by any other developmental theory of personality as well. In my view, if concepts and studies of socialization focus on these trends and on the ways in which the social environment speeds, retards or deflects these trends, we will get much farther.

I would like to briefly outline an approach to socialization that shares the developmental assumptions that Solnit and Lourie have made but derives them from a different source. The assumptions shared with psychoanalysis are that social development involves transformations in ego structures, which have a directed and sequential stage-like quality and which depend upon environmental stimulation for their development but are not direct reflections or internalizations of the environment. Social development or ego-development does involve natural trends which lead to the solution of universal developmental tasks. In our culture and I think in any culture, we focus on capacities for love, for work, and for morality; and adequate socialization represents the development of these ego-capacities. Parents are more concerned about the development of these capacities than they are about the direct training of very specific patterns of expectations in their kids. So in this sense socialization is a good thing; it is not just cultural conformity, it is synonymous with ego-development.

Let me turn to my divergences from Solnit's assumptions. Recent research suggests that the psychoanalytic focus on the specialness of the parent-child relationship or the mother-child tie and on the specialness of the early methods of development is not really supported. It suggests that special parental relations are not needed to lead to the development of effective ego-energies or tendencies. There are from the start of life effectance or competence motivations, and development is basically a process of cognitive structural change in these motives or tendencies. A variety of cognitive and social stimulation is required to support this structural development, but the specificity of particular forms of need gratification or the specificity of the mother-child relationship is somewhat misplaced. There is a great variety of stimulation that can serve the same developmental functions.

I mentioned earlier that the child-rearing literature did not really indicate strong and unique dependence of personality development upon particular parent inputs. The importance of the parent-child relationship appears more in the study of the pathological parent than the study of the normal parent. There is considerable evidence that bad mothers are worse than no mothers at all — that is, worse than an enlightened institutional environment, for instance. I can't cite here all the kinds of research findings that might be used to support this position, but let me give a couple of examples. The first is Lourie's and Solnit's discussion of the pica phenomenon. The discussion makes it clear that the mothers of the kids who are eating lead and other things aren't paying enough attention to the children. What the discussion does not make clear is whether if the children had a little bit more social and cognitive stimulation in their environment, that would eliminate the problem, seen as a response to boredom, or whether there is something deep about the mother-child oral bond that is being substituted for by the pica behavior. I think that is an open question. There are obviously deficiencies of stimulation here, but not necessarily something that requires the psychoanalytic notion of the early mother-child tie to support it.

More generally, as I read Yarrow's review of the literature on institutionalization and its effects on infants, I get less the picture that there is something unique and critical about the mother-child emotional relationship, and more a picture that there are a variety of social and physical stimulations that mothers typically provide but that can be provided in a variety of other ways. These forms of stimulation are necessary for both cognitive development and social development but the unique mother-child bond may not be.

I would like to suggest that animal studies suggest something similar. Harlow's recent findings suggest that the baby monkey's development requires other monkeys (peer or adult) to play with, to engage in reciprocal social interaction and stimulation, to be objects for imitation, and so on. This interaction is necessary but the actual presence of a mother is not necessary. Interaction with the mother is neither necessary nor sufficient for normal monkey development.

Now, I'd like to suggest that the kind of view I am presenting is one in which the child's development of an object concept as described by Piaget is applicable to the development of conception of a permanent social object. The findings of Shaffer and Callendar, and so on, primarily indicate that the major determinant of response to maternal separation is an age and cognitive maturity factor rather than specifics of the mother-child relationship. That is, until the child has formed a general object concept he doesn't respond to maternal loss or to hospitalization and so on.

I will end with a finding with regard to fathers as opposed to mothers. In a study that a student of mine did, we compared father-absent and father-present Negro children and then a group of middle class boys, with regard to a variety of measures of sex role identification, doll play, the "It" test, somatic differential pairs, and so on; and in all these measures we found in all the groups of boys the same age-developmental trend, and a movement from a mother identification to a father identification in the age period from four to seven.

We found the bright children in all groups markedly advanced over those with average IQ, and those with average IQ over the retarded or those with low IQ. That is, IQ was an important determinant of performance on the projective tests as well as on the more pure sex typing information tests of masculine identification. In contrast, we found very little difference between the father-absent and the father-present children in these developmental trends. All the groups of boys of mental age four were mother-oriented while all the groups of boys of mental age seven were father-oriented.

Now, the father-absent boys presumably didn't have a father at all to identify with, but they showed the same developmental trends as the father-present children toward father identification. Furthermore, bright father-absent boys were accelerated as compared to the duller ones on this trend.

I won't go into the cognitive-developmental theory of sex-identity which I have tried to use to explain this kind of finding. I do think the finding indicates that there are natural developmental trends in social development and that they depend on cognitive restructuring of the environment. If this is the case, there are multiple functionally-equivalent channels for the kinds of stimulation needed for this development. Furthermore, the child-rearing variables that have been found to be important in development, such as maternal and paternal warmth, can be looked at as favoring advance in these natural trends of socialization rather than as necessary causes of them.

ASPECTS OF SOCIALIZATION AMONG MINORITY CHILDREN Harold B. Gerard, Ph.D.

I am a social psychologist and until about a year and a half ago had spent my entire professional life in the laboratory. More recently I have been studying the desegregation of the city schools of Riverside. I will tell you how a fellow who has for so long led a very peaceful life gets sucked into a maelstrom of problems.

In the summer of 1965 young, militant Negro parents in Riverside, following a failure of the Head Start Program there, began to bring a lot of pressure to bear on the school board to change things. At that time I was going to all the school board meetings, and they were among the most exciting experiences I have ever had. And when I saw that the school board was really trying to cope with the problem, I thought I might search the literature for what is known on desegregation, so that the school board would know what to expect.

I came up with a blank.

At that time there had been a study in Washington, D.C., and one in Louisville, both so badly confounded that one couldn't draw any conclusions about the effects of desegregation.

For example, in Louisville Negro children were being bussed to previously all-white schools. Other Negro children were being left behind in the segregated situation. When the children were tested, it was found that the Negro youngsters who were being bussed improved. The white children in the receiving schools also improved. And the Negro children who were left behind improved.

Evidently, something was happening in Louisville, which was independent of the desegregation.

I decided that I might study, say, a hundred Negro children in Riverside and analyze the achievement-related attitudes of these kids, to see what happens to these attitudes as they come into contact with so-called middle class values.

With the help of funds from the Rockefeller Foundation, the University of California, and some other sources a group of us including a sociologist, another psychologist, two people in the education department, and an anthropologist formed a team. Suddenly, we were given lots of money by the California State Board of Education and were talked into studying not only the hundred Negro children I had planned to study, but all of the Negro children in Riverside who were going to be bussed and all of the Mexican-American children.

Not only that. For every minority child going into a receiving school, we selected at random a control child already in the receiving school who was at the same grade level. Riverside has 6% Negro children, and 11% Mexican-American.

We discovered that there was not only no literature on desegregation but no useful literature for us on how you study attitudes of children. Accordingly, we devised quickly a number of tests, and adapted others, with no real hypotheses to guide us, but with intuition as to what might predict kinds of attitudes or might predict success or failure in the new situation.

We have five perspectives on each child. Each child was put through an intensive battery of tests in two one-hour sessions, in which we measured whatever attitudes we thought might most play into the school situation, including achievement, motivation, self-attitudes, and anxiety. Most of these were performance measures. We also adapted the Witkin rod-and-frame test, which turned out to be a bonanza.

I will briefly describe two results: those with the Witkin and those with a test of cognitive dissonance.

In our adaptation of Witkin's rod-and-frame test, the child looks into a four-foot long box, at the other end of which there is a phosphorescent frame and a silhouette of a man. (I thought the man would be more appealing to a child in a dark box than a simple rod.)

The tester was standing at the other end of the box, and she tilted the frame 28 degrees to the left or to the right, and tilted the silhouette of the man 28 degrees to the right or left, either in the same direction or in the opposite direction in the frame. The task of the children was, with a knob, to orient the man to the true upright. Witkin and others have found that this test taps some kind of pervasive personality characteristic. We found tremendous differences between the white children—we call them Anglo children in Riverside—and the minority children. The Anglo children are much more field-independent; that is, they orient to the true upright much more successfully than do either the Negro or the Mexican-American children. And this difference persists through age 12. We also found within each of the groups the difference between males and females that Witkin reports: that girls are much more field-dependent than boys and orient to the frame. That is to say, the child compromises, and tilts the man so that it is somewhere in between; he tilts the frame to a true upright.

We must analyze these data before we can add anything further. We have these measures which sharply separate groups of children before desegregation, and have retested them one year later. We do not yet know what the retest data will reveal.

The other test I want to talk about we have called a tolerance for dissonance test. It was Fessinger's theory of cognitive dissonance that inspired the development of this test.

Research has shown that when a person makes a decision, he tends to justify that decision, and manifests that tendency in a number of ways. One way, for example, is to find the chosen alternative more attractive after the decision than it was relative to the non-chosen alternative before the choice, as has been demonstrated in many studies.

I thought that one of the measures of ego strength, to put my remarks in harmony with those of some of the other speakers, might be the extent to which a person tends to justify his decisions. For when a person makes up his mind to do something, harboring regret about what he has done is very dysfunctional. In a situation where he has to maintain an unequivocal behavioral orientation toward the chosen alternative, one way of maintaining this orientation is to attempt to justify what he has done. People who have strong egos presumably would tend to do this more than people with weaker egos.

I thought this might also be a useful measure of achievement-related attitudes.

We conducted our tests in trailers. When the child came to the trailer for his first one-hour session, the tester presented him with an array of ten very attractive toys, and asked, "Which toy do you like best?"

And the child indicated the best-liked toy.

And then which of the remaining toys? "Which do you like best?" And so on.

In this way the child rank-ordered all of the ten toys. He then went through the other parts of the testing session, at the end of which he was told, "Johnny, you have been such a good boy that we are going to give you a present, and we can give you either this toy or this toy." And we presented the child with a choice between his third and fifth-ranked toys.

When the child had made his choice, we said, "Oh, by the way, Johnny, the toy manufacturer would like you to reevaluate these toys." Whereupon the child again rank-ordered the whole ten toys.

Now, an indication that the child had reduced the dissonance that he had experienced would be for the third ranked toy, which was the toy he chose in practically all cases, to increase in rank, to be liked more, and for the non-chosen toy to decrease in rank.

What we found is very curious. None of the five-year-olds in any of the three groups, Mexican-American, Negro or Anglo, show this effect normally found with college sophomores.

As a matter of fact, they show regret. These five-year-olds tend to *increase* the value of the rejected toy relative to the chosen toy. But Anglo children at about age 7 to show the adult pattern, to over-value the chosen relative to the non-chosen toy, and by the time they are in the sixth grade, they do it as much as college sophomores.

Negro and Mexican-American children continue to show the regret effect well on past the age of ten — and the Mexican children right on to the sixth grade, tending to devalue the chosen relative to the non-chosen toy.

Now, I would like to tie this finding in with an experiment I did some years ago, in which I varied the subject's self-evaluation in an experimental setting of the kind that these children were confronted with.

A group of high school art students were presented with fifteen paintings, which they rank-ordered. Each subject was then presented with a choice of two of the paintings, either close in value for him or disparate in value, sometimes being told he could keep the painting he chose, sometimes just that we wanted him to state a preference as to which one of these two paintings he liked better.

These choices were made under three conditions, after the subject had taken in his classroom an art judgment test before he came into the laboratory. When he entered the laboratory, he was told that he was way above the norm in his ability to judge art or that he was at the norm or way below the norm.

This was completely fictitious, having nothing to do with his score on the art judgment test. It was just the vehicle to enable us to prepare this manipulation of self-evaluation.

I found what I predicted, that the dissonance effect, the spreading apart of the two-choice alternatives so that the chosen one is valued more relative to the non-chosen one after the choice, will occur only where the subject has a positive self-evaluation.

I was astonished to find that those subjects who are in the negative self-evaluation condition, having been told they were poor at art judgment, showed regret effect.

Independently, Andrei Molevski in Poland has carried out almost the same experiment with children the same ages as these high school children that I used, but instead of manipulating self-evaluation in the way I had done, he took position in the peer group as the independent variable, the indicator of self-evaluation. He made the prediction that people low in the peer group would have a negative self-evaluation and would show regret, that people high in the peer group would show a dissonance effect, and he got exactly the same results I got.

I see a connection between the laboratory experiment with high school art students and Molevski's results and the results that we got in Riverside with the Anglo and minority children.

We do not yet know what the effects of the desegregation experience will be on this ego measure as the kids go through school.

FRANK GARFUNKEL, ED.D.

In some of the issues that have been brought up, I see some important sources of variance being gotten at. But I don't know what they mean any more than I know how to calculate how much putting a stick in Niagara Falls will change the flow of water.

I do not know how much we can consider socialization of the child in the family without at the same time looking at socialization in classrooms, in schools, in families, in the community, and, what is becoming most relevant now, in the larger communities.

We see around us dramatic examples of communities where there is socialization with extremely destructive manifestations — in the form of riots, bitterness, and intransigence. This reflects from and reflects on what we see in schools and families.

I do not suggest that we should not study socialization within the frameworks that have been indicated, but that a look at these other factors, at the educational genocide going on in many of our schools, is of critical importance if we are to better understand mental health and illness.

Socialization is rather reflexive, and problems in the family have their manifestations in these other areas.

This is just as surely the case in the ghetto school, as it is in the socialization of retarded children in *their* families, and in the socialization of their families and of other families into the community.

I see a rather large perspective in which we ask a lot of these questions, such as the very important one that Kohlberg referred to: What is the relationship between the *family's* functioning and the child's behavior? Why we are not getting answers to some of these questions may be the result of examining a small component of variance which is lost in the midst of larger components. Our tests and our observational or analytical procedures lead to a myopia which is quite incapable of getting at crucial streams of influence.

Let us focus on just one of the concepts that we have been interested in — namely, control. By this we mean control that a child has of his environment during the socialization process, control that the teacher has among other teachers and in the school, control that the school has in the community, and for a particular example, control or lack of control that certain agencies have had in Head Start programs in the community. We see the rather tragic possibility that effective controls in some of these areas may be seriously impaired, if not eliminated, by the imperative of institutional survival.

With all his need to feel he can control his own destiny, a child comes into the classroom and day after day is told what to do, when to do it, and how to do it. He is put in a continuous position of being told, in effect: "You don't ask questions. You just find out what to do, and you do it, and you keep quiet while you're doing it."

I think we are telling communities to do the same thing, and we are telling families to do it. I am afraid that if we start telling parents, "If you go and look at your child more, your child is going to be more attentive and be a more differentiating person," we may be running into the same trap. We will be doing to that parent exactly what we have done to the child. And we may wind up in the same place — the poor remaining poor.

Similarly, we may begin to tell our communities of subcommunities that they have got to hold to certain norms and that they do not have the choice to break these norms — though examples abound of transgression of norms, even among elected public officials. We may not see that these norms do not represent absolute restrictions, against, say, speeding or parking in the wrong places. Actually, you can and you might speed or double park; and the consequences are in some meaningful way laid out if you are caught. (But you must own a car and be able to drive it in order to violate motor vehicle regulations.) Certain communities are, in fact, now demanding the power to make some of the decisions affecting their lives, and some people think quite unreasonably. Some people call it "Black Power" and some have other names for it.

People want the right to make mistakes, which is a nice way to say that they want the right to steal. They want the right to have graft — which gives them the right not to steal. But you do not have the right not to steal unless you have the right to steal.

In the socialization of the child in the classroom, it seems that we categorically do not give these children the right to make choices. As an educational psychologist I do not see the possibility of meaningfully studying only one fragment of this problem. I do not know that we can afford to do less, if in fact we can afford to do anything.

More particularly, we know that we have had tremendous problems trying to associate teaching methodology and achievement. For all practical purposes, in different classes children achieve more according to social class and developmental factors than according to whether they are taught by a particular method, or in a particular kind of school.

It seems to me that what is misleading here is again the same thing as in studies with families — that there are a lot of determinants of achievement in a child's life. There is a large pool of variance, much of which is accounted for by developmental factors. We are not likely to have measurements that are sensitive to interventions or to differentiations among interventions.

I am suggesting that to put our finder on the determinants of a child's socialization we must proceed pragmatically, if his socialization is to have any relationship to what is going on in the community or to how what is going on in his own community relates to the larger community.

CALVIN F. SETTLAGE, M.D.

How can the stimulations which the mother provides to the infant be separated from the affective or emotional components of her relationship with him? To me this is an impossibility. Harlow's terry cloth monkey mother, though preferred in the quality of her "stimulation", was quite inadequate in emotional output for the ultimate social development of infant monkeys.

As others have noted, the term "socialization" has been used quite loosely, with various meanings. I would like to suggest that it is of value to distinguish between the basic or initial socialization achieved in early infancy, and the more complex socialization which evolves during the later stages of development in childhood.

Basic socialization is achieved in the mother-infant relationship during the first weeks and months of life. As a result of its attainment the infant values and wants relationship with the mother and through it becomes meaningfully related to human beings generally. Failure to develop this basic socialization is seen in the autistic psychoses of early childhood, in which the child displays no interest in people, and little or no apparent capability for development of relationships with them.

The attainment of basic socialization is followed by a graded series of steps, for some of which Lourie indicated critical periods. Difficulties or failures may occur at any point, and the resulting problems will differ accordingly; but problems in socialization arising during later development are never as severe as those resulting from failure to establish at least the basic social relationship.

Solnit used the term "failure to thrive" in two different ways: First, with the usual meaning of the infant failing to thrive; secondly, in introducing the concept of the parent (the mother) failing to thrive. I find the latter to be an intriguing and helpful way of viewing the mother's inability to meet the needs of the child.

A correlated concept from psychoanalytic theory deals with the problem of libidinal or emotional unavailability of the mother to the child. For a long time, concern about the impact of separation experiences on the developing child was focused upon actual physical separation, for example, by hospitalization of child or mother, or by death of the mother. In recent years we have become increasingly aware of the damaging effect of libidinal or emotional separations which can and do occur while the mother remains physically present with the child. The classic example is that of post-partum depression in the mother. Such a depressed mother may be capable of ministering to her child's physical needs, but insufficiently involved with him emotionally. This lack of libidinal availability, if severe, results in lack of necessary stimulation of the infant and in deprivation of his emotional needs, both kinds of interchange being necessary to the development of socialization.

I support Solnit's emphasis on the importance of continuity in the child-parent relationship for the socialization of the child, and offer an example of how mother and child can have a very discontinuous experience even though they are daily in each other's physical presence.

In observing a 2½ year old boy with the presenting symptom of pica, it was apparent that he had another previously unrecognized symptom. He was able to turn on and turn off his relationship with people, his mother included, as if relationship were controlled by a faucet. At a time when he was sitting on his mother's lap, warmly inviting and accepting affection from her, with obvious pleasure and appropriate verbal communication, he could abruptly turn the relationship off, becoming withdrawn and apparently retiring to a world of phantasy. This child was not autistic or psychotic, however, and his ego development generally was quite adequate and age appropriate.

This on-again, off-again, on-again pattern of behavior came to be understood as a response to a similar pattern in the mother. Using Dr. Solnit's concept, she could be termed a "failure to thrive" mother. She had so many unfulfilled needs from her own childhood and from her current marital relationship that her capacity to give of herself was extremely limited. When she gave she gave in a qualitatively good way, but when feeling depleted of emotional or libidinal reserves she would withdraw within herself for a time until she had replenished her libidinal reserves and was again capable of giving. As a result, the mother's relationship with her child was repeatedly established and interrupted as she, so to speak, turned herself off and on.

The child's adaptation to this circumstance was to develop the ability to do exactly the same thing, first in reaction to his mother and then on his own initiative, independent of her emotional state. The latter independent, self-initiated behavior illustrates Solnit's point about the importance of the shift from passivity to activity in the child's attempts at mastery.

To me, the concept of failure to thrive in the parent and the concept of libidinal unavailability of parent to child are closely related. These factors and their determinant roles in socialization, and in personality development in general, deserve careful consideration.

I now wish to offer some rather speculative comments about socio-cultural factors in socialization, derived primarily from observation of middle class families. In our American culture today the extended or kinship family is of relatively little importance as compared to European cultures and to some of the so-called primitive cultures. In these latter cultures a child is not so wholly dependent upon his mother and father for his care as in our own culture, and his needs may be met by a variety of other people, including older siblings and adults of various ages in the kinship family. This circumstance would appear to facilitate socialization both through increasing the number of people with whom the child has (presumably sanguine) experiences, and through decreasing the sometimes pathological intensity of the relationship with the parents.

This loss of supportive help from the extended family is aggravated in our culture by our great mobility and the seeming ease with which new families leave the geographical vicinity of their families of origin. It is further aggravated by policies in business and industry which transfer personnel to distant places with little or no awareness of the undesirable impact this may have upon family life and child development.

A second cultural factor bearing upon socialization is the lack of agreement among parents as to values and child-rearing practices. In previous eras there apparently was much more of a consensus as to the values by which children were to be reared. My emphasis is not on the choice of particular values, but on the fact that parents derive security and support from consensus and that children benefit from the resulting unambivalence in child-rearing attitudes. Under such conditions the boundaries of behavior for the developing child are more clearly defined and in consequence there is less confusion and greater ease in interpersonal relationships within the family. Also, the universality of the social values shared between families makes for a greater ease in extra-familial social relationships.

A third cultural factor, about which there is perhaps even less understanding than the previous two, is the early and excessive exposure of children to television. At first glance one might think that exposure to television with its steady and unremitting supply of visual experiences and of the verbal symbols necessary for language development ought to facilitate socialization of the child. Certainly the child's opportunity to "observe people" in various kinds of behavior is vastly increased.

I have seen a few children under the age of three years in whom quite precocious verbal and intellectual development may have been related to constant exposure to television, used as a babysitting device, beginning in early infancy. If this correlation is valid, one wonders whether there is a further correlation with the existence of psychiatric problems at such a tender age. It seems to me to be entirely possible that the premature or precocious development of a partial capacity for symbolic understanding and expression could result in excessive fear, anxiety and repression; a child with such a capacity could imbue his observations and experiences with more complex (usually false) and more threatening meanings that would normally be possible.

For example, children note anatomical differences between the sexes at least by the time they are 12 to 18 months of age, doing so with manifest curiosity but usually without evidence of concern as to the implications of the differences. The prevalent childhood notions of the female having suffered some kind of injury to or loss of the genital organs arise later, usually by the age of 24 to 36 or 48 months, as a result of the development of the capacity for phantasy and concept formation, particularly of cause and effect relationships. When the capacities for phantasy and concept formation are precociously developed, the child then can entertain these same notions at an earlier age, when his generally more immature ego is much less able to cope with the implications and the associated feelings and anxieties.

More directly pertinent to the issue of socialization is the influence of the content of television upon developing children. Perhaps young children can survive the general wealth of inanity which it offers and the surfeit of minor human tragedies portrayed in the constantly interrupting and repetitious commercials. But one can't be as optimistic about the impact of the major tragedies portrayed in the "soap operas" or of the subtle and not so subtle sexual scenes, or of unremitting violence and evidence of man's inhumanity to man, seen both in the fictional shows and in the "live" news broadcasts — particularly so because the quality of make-believe is subverted by "realism". The fact is that, in the absence of proper parental supervision, a child can be inundated by this kind of material, the great bulk of which would hardly qualify as a socializing influence in the best sense of the term.

In my view, both the longstanding and the newly emerging socio-cultural values, explicit or implicit, and the child-rearing practices upon which they come to bear should be the object of careful study and if they can indeed be proven detrimental to the development of our children, of active attempts at changing them.

WILLIAM J. MEYER, PH. D.

I have been reminded of a depressing experience I once went through. In a bit of clinical practice as a consulting psychologist in a wealthy school district I found that I was getting more and more interested in diagnostic work with first and second graders, to a lesser degree third graders, because I thought in my ignorance that I had discovered an infallible diagnostic technique. Then, of course, I read the literature, and found out it had been discovered long before.

It was, in effect, that kids referred in the first and second grades because they didn't know how to read almost unanimously did very poorly on any one of several perceptual motor measures. I used the Bender because it was convenient and because one would see rotation and angulation problems and so on, which were very exciting. We collected Benders on 489 kindergarten children, in three-month intervals over a period of the kindergarten year and the following first grade year.

Now when we correlated Bender scores administered on these 489 youngsters in September of the first grade with their reading achievement, the correlation was about 0.25 or 0.30. This was a tremendous disappointment to me, because clinically I thought I ought to be able to predict without error the children that were going eventually to be in significant difficulty with reading. It didn't work.

Next we thought, as we were developing our two-year longitudinal data, that we were in remarkably good shape by February of the kindergarten year to predict who would *not* be a failure; we thought, in fact, that we could do this without error. But as late as February of the first grade 80 percent of the children who we predicted would be failures had not yet turned out to be failures, and we could never quite find out why.

My point in bringing this out is simply that one runs certain risks in working with clinical groups or with extreme groups, say the good ones in contrast to the not-so-good ones, leaving out the middle. The risk you run is that you are measuring the effects, in your extreme groups or in your clinical groups, of variables about which you have no understanding. You don't know what they are, but without them your prime independent variable, the one you have data on, might not give you significant correlations.

And so I raise the question whether, if we are going really to know what socialization is about, we may not have to steer off from the clinical groups and the extreme groups and begin to look at the total spectrum of socialization situations.

Next I think that in terms of theory-building we are going to have to make some decisions about our terms and about what kinds of theories we are going to be happy with. When as a person primarily in research I begin to deal with terms like mother-warmth, identification, sadistic impulses and repression of same, depressive and/or depleted states, or, indeed, to come back into my own area and not be totally biased, with terms like reinforcement and reinforcer-effectiveness and drive and even things like drive-reduction and reinforcement and incentive, I think we get into some terrible problems of circularity of definition. Something becomes a reinforcer when behavior is strengthened, or something becomes drive-reducing when the animal doesn't want to eat anymore.

These are things that create problems.

I think that our theories of human development are close to being abominable. Our theories of human behavior are not a great deal better. I think this has been a glorified hangup for students of human behavior, because we put ourselves in tight little circular models and we get angry when somebody breaks the circle.

My next point deals with what I see as the really monumental problem in study of socialization in the context of the family and of the school. It is the problem that has been called "the lost sign".

Someone once said, "You show me any third grade child not reading, and I will tell you he is either retarded or emotionally disturbed." Now, of course, he can get data from here until doomsday to demonstrate that intellectually normal third grade children who are not reading will give you signs that they "ain't all too happy."

But if one looks at what a non-reading child must have to go through to reach the third grade, it's a wonder that instead of just being unhappy he isn't beating out windows.

The lost sign, of course, is that when you look at this child in the third grade you don't really know — and many people don't care — what has happened to him for the previous two grades at a minimum.

When we start to look at things like slowdown in development, we say we have lost the sign of some biological defect which begins to emerge at such-and-such an age level in the fact that the child begins to look depressed, stops growing, and so on.

The lost sign is a very serious problem, and it almost dictates the kinds of research that need to be done. It is very costly research. It involves, in fact, trying to follow children from as near conception as one can make it, getting medical-biological data on the mother, getting the very best kinds of assessments of the biological status of the organism at birth, and following this entity as a biological organism.

One searches in vain among our theories in psychology for the possibility that variations in children have an impact on what mommy and daddy look like. There may somewhere be a footnote that indicates the possibility that an aggravated, restrictive mother got that way because without this kind of mothering her child would take her apart, the house apart, the neighborhood apart, and conceivably the school apart.

To get at this kind of problem we may need to turn, in terms of strategies as one of the issues of this symposium, to large-scale, multidisciplinary, longitudinal studies in which we try intelligently to identify the biological, sociological, psychological variables.

One of the problems is: How do you define outcome?

I think we have to define outcome, perhaps unfortunately, in terms of what cultural expectations are. A guy makes it (fits, succeeds) in the culture or he dosen't make it, in cultural terms. He may define himself as an unhappy millionaire — you know, get angry at a hotel and buy it.

Then there are other kinds of problems, such as the whole business of the ethics of research of this kind. Do you go into a family and make continual observations like those proposed without contributing anything? And if you do make contributions, what does it do to the outcome of your research? I haven't heard us come to grips with this kind of thing.

DISCUSSION

SOLNIT: One of the issues suggested by previous discussion is whether we should be discouraged because we are better able to define our limitations. Very often the definition of limitation enables you then to go further in examining the complexity of the data.

I feel that there have been too many errors made in the past in isolating one variable from another which cannot realistically be separated when it comes to the study of human development. And I agree with Dr. Meyer that the research for the next few years has to be *action* research which is dirty research, but fruitful. We will not be able either ethically or from a research point of view to get the data we need unless we can provide a relevant service for some of the families studied. The window of pathology is, of course, a restrictive and distorting one. But it is ofttimes the best way to get started in raising the most fruitful formulations and hypotheses, which can then be taken to a normative group for examination and in order to examine the problems of normalcy as well as of pathology.

I feel that Garfunkel is right to give a great deal of importance to the priority of the community and of the schools, where the action is, so far as our children growing up are concerned, who are trying in so many ways to tell us what is going on. We need only to know how to translate their language.

But I do feel that the study of the individual, whether he be from an underprivileged group or privileged group, can be extrapolated if one is careful not either to over-extrapolate or under-extrapolate, and if one uses his study of the individual to examine the limitations of what one knows.

I think that one of the things that some of our colleagues are feeling pessimistic about — and I would urge them to reconsider this — is that they are expecting to be able to make long-term predictions; I do not think, the complexity of human development being what it is, that we should expect that. I think we should be satisfied with short-term predictions based on our continued observation and continued examination of the data at hand.

KOHLBERG: Gerard talked about two measures of what he called ego maturity or ego strength. I hate to think that the ability *ex post facto* to rationalize one's decisions is really a measure of ego maturity, but let's accept, anyhow, that at least from the age of five to seven it is.

Both this rationalization and the Witkin test represent measures that are heavily developmental and heavily cognitively loaded. The Witkin test relates quite closely to Piaget's measures of the development of spatial conceptualization.

We have here, then, a set of variables both cognitive and ego, relating both to cognitive maturity and to various forms of self-esteem, in respect to which development proceeds at different rates in different cultural groups, owing presumably to different inputs of cultural stimulation.

I think that when we reach the point of dealing with these kinds of measures — that is, measures which are clearly developmental and which have something to do with ego functioning — then we can all begin to talk in the same language. Because if we talk about parent-child inputs which have been found to affect these kinds of measures and about cultural deprivation and social class and peer group status or role-taking, we are dealing with developmental variables which we can examine from a number of points of view and make sense out of. When we do get a clear set of developmental variables, some of the kinds of radical differences of framework that we are talking about may be reconciled so that eventually the social psychologist interested in desegregation and a person in ego development and a psychoanalyst can get together and work with something in common.

LOURIE: I would like to suggest that we must start from the beginning, since individual differences, the endowments of the individual, are really the most important components we are dealing with. The meaning and effects of inputs we introduce, whatever we may call them, are determined by what we start with. Even the worst kind of institution, for instance, has always had some babies who not only survived but grew up perfectly normal.

What makes the difference for these individuals who need only crumbs of experience, inputs, or whatever you want to call this, who can still come out normal, can make their own gestures, find their own experiences and integrate them, needing very little more?

DAVID J. KALLEN: I have been impressed that with increasing age the number of sources of influence that you have to assess in accounting for the child's behavior multiplies; and that when you are trying to predict the adult role or the final outcome of the person in society, it seems that the greatest single predictor we have is a combination of race and social class.

I am very much impressed with the racial differences that Gerard finds in variables which are presumably psychological in origin, but yet seem to be totally determined by social position. Somehow in socialization research there is a concentration either on these gross variables or on the microscopic mother-child relationship without enough attention paid to the meaning that parents' actions toward a child may have, depending on the social class or other cultural context in which that parental behavior takes place.

GERARD: I want to amplify the implications of what Kallen has just said and give you a little more on what we are doing.

We recently compared the goal-setting behavior of Negro children and white children in the context of a target game, like a penny arcade game, where the child saw a rocketship going across the screen and fired a flashlight gun at the rocketship.

We rigged it so that the child couldn't tell when he actually hit the target, a hit being indicated by lighting up the rocketship, which glowed red when hit. Each child was presumably competing with another child in another room. His score and the presumed other child's score appeared on the panel over the rocketship, indicating how many hits each made out of ten shots. The game was all rigged with switches so that the subject either beat his opponent or was beaten, and could do very poorly or very well relative to his opponent.

This then was done on a series of trials, after each trial the child being asked to state the number of hits he expected he would make on the next trial.

We have found some very interesting things. For one thing, the goal-setting of Negro children tends to be very unrealistic. I think this has been found previously. But not only are Negro children much less sensitive to winning or losing than white children are, the white children become more and more sensitive with age, whereas the Negro children don't seem to develop comparable sensitivity. They do raise their sights when they win, and they lower their sights when they lose, but not nearly to the degree to which white children do. And we have found in other studies as well that Negro and Mexican children are also much less sensitive to social reinforcement.

We have also measured self-attitudes. We have administered an ethnic pictures test where the child looks at six faces; two are Negro, two are Mexican, and two are white. He is asked to rank-order these faces along certain dimensions, such as kindness, happiness, strength, speed, who gets the best grades, and who you would most like to have as a friend. We found that minority children are laboring under a tremendous burden. I can't fathom how they can succeed in school with the tremendous deficit in self-attitude that they hold.

For example, when you ask minority children who gets the best grades, you find that at five years of age the Negro child is just as likely to choose a Negro, Mexican, or white child, and that's the same for the Mexican children. The white children, on the other hand, already at five years over-choose the white faces as getting the best grades. With advancing age the Negro and Mexican children begin to behave in their choices like white children: to over-choose the white faces. And these children have had no experience at all with white children in their classrooms! They were in segregated schools!

By the time they are 12 years old minority children are over-choosing the white faces more than the white youngsters are over-choosing the white faces.

This theme runs through all our data and our society. It's seen on television. It's everywhere. We can demonstrate on measure after measure that this deficit already exists at five years of age. There is a tremendous job we somehow have to do.

LURIA: I think we psychologists want things awfully cheap. We do studies on children that have had a number of years of the most incredible kind of deprivation and then we get mad at outselves that we can't do better by giving them six months or a year of Head Start.

We don't know the answer to this problem. We really don't. We need some conception of the mechanisms involved in children's learning and in their affective development, but the notion that there is something in the mother-child relationship is about the level of the ideas that we have.

We are not going to get the answers cheaply. Why should we feel that we will get them from action research, for example, when we don't really have substantial theories about cognitive development yet? The rationale for action programs is purely moral — that these kids deserve a better chance. We don't know what constitute the elements of a better chance. That still seems to me to be a question for basic research. We will find out the answer by doing research of the sort that we have now started on infants, on mother-child ties that involve fairly substantial numbers of variables. We must find out the structure of these variables before we can expect to have some impact on children.

We have talked about socialization in such ways that I feel I haven't the vaguest what it is. We have talked about mother-child ties, cognitive structure, and impact over the long haul; that is, about personality prediction over a 12 or 15-year period. It's obvious to me that no scientist would expect to be able with a small set of variables to predict all of these things. We are talking about thousands of processes; how can we expect to get good predictions about thousands of processes when we still call them by the same names?

MEYER: The demand on the social scientist today is to produce. That is what the money which supports his work is for. All of us have a responsibility to fight off those in Washington who ask questions like: How much does it cost to raise a child's IQ a point? Serious, powerful men are asking this kind of question.

My answer would be this: Let's go back and do our work in the basic, controlled ways in which we can get answers. If we can't do that, 15 years from now we will be wondering why we are still talking at the level of mother-child warmth.

As one of my colleagues pointed out in commenting on my presentation: Yes, out of working with individuals, out of action research, out of being involved, you begin to see some different kinds of questions that might well be asked. But I think if we are going to get reliable answers and guides to action, we have got to do this systematically under controlled conditioning. My concern is that this kind of research is not being permitted to be done anymore in terms of the agencies supporting research, which want results and early solutions to big problems. I don't think we have them.

PART IV COGNITION AND LEARNING

Papers by

Bernard Kaplan, Ph.D., Department of Psychology, Clark University
Irving E. Sigel, Ph.D., Department of Psychology, State University of New York at Buffalo
Jerome S. Bruner, Ph.D., Center for Cognitive Studies, Harvard University

Respondents

David Elkind, Ph.D., Department of Psychology, University of Rochester
Herbert Zimiles, Ph.D., Research Division, Bank Street College of Education

The discussion of cognition is introduced by Bernard Kaplan's plea for examination of what is meant by "human development". Irving Sigel introduces the theme of hierarchical organization of behavior; he prefers to sideline it, but it recurs repeatedly. The notion is emphasized that inferences regarding cognition drawn from observations of behavior of infants and children cannot be assumed to have generality except within the social and cultural contexts in which that behavior is observed.

TOWARD A DEFINITION OF HUMAN DEVELOPMENT **Bernard Kaplan, Ph.D.**

In his dialogue, *The Meno*, Plato implicitly suggests a cardinal rule about knowledge-seeking in general, including seeking knowledge about knowing. The rule is: "Unless it preserves the distinctions between fundamental questions and derivative ones, always attacking the fundamental ones first, any inquiry must end in confusion."

Following this maxim of Plato's, in the remarks that follow, he should not be held responsible if I am misguided in mistaking secondary for primary issues. In any case, in accord with Platonic tradition, I will deal less with answers than with questions.

Before we can deal fruitfully with such a topic as "cognition and learning in human development", we must have some clarification as to what is meant by "human development", "cognition" and "learning". I will direct my queries mainly to the first of these large, vague and imprecise notions.

What does "human development" mean? The quest for definition, and the critique of definitions, are important prolegomena to any future inquiry.

In a penetrating essay dealing with the definition of scientific method, but having much wider implications, Max Black emphasizes that "any definition removing inconsistencies or involving a redistribution of emphasis will redirect the interests of those who use the term, provided they can understand the definition and have sufficient intelligence to be moved by rational considerations." Black goes on: ". . . definition of difficult terms is usually a process not regulated simply by the character of the concept to be defined . . . strictly speaking there is no determinate concept in such a case."

But what has this got to do with the meaning of "human development"? I submit that the regnant concept of "human development" held by most American psychologists is rooted in the uncritical and uncriticized adoption of a persuasive definition foisted on us, perhaps unwittingly, by a generation of child psychologists and several generations of scholars imbued with positivist-empiricist notions of science. This customary definition, so ingrained in most of us that we accept it unquestioningly, has oriented inquiry along certain paths that I feel lead nowhere, unless we start to build highways from another direction.

I am asking for criticisms of the existing tacit definition of "human development". What *should* we mean by the phrase? To what *should* it refer?

My questions revolve around two admittedly artificial contrasts: "human development" as a descriptive concept or a concept by intuition in Northrop's terminology, and human development as a stipulative, normative notion or a concept by postulation.

The first polarity is between "human development" pertaining primarily to individual man (ontogenesis) and human development applied primarily to mankind (socio-genesis and anthropogenesis).

Of course, I am not concerned with changes in the anatomy of man, but solely with changes in his mentality, in his cognition in a pre-analytic sense. Is the most fruitful course one that starts with man as having a fixed nature, and that assumes that this nature unfolds in a certain way, irrespective of place, time and circumstance? Is one to use the term "human development" to refer to those observable changes that are manifested in individual human organisms from conception to death, hoping vainly to undertake a wide enough sampling so as to arrive at empirical generalizations concerning the nature of man and the course of his cognitive growth?

Or should one limit the term only to inductively derived "universals", whatever that might mean, concerning invariable sequential changes in the mental functioning of individual human beings?

More fundamentally, I am asking: "Is it really possible to understand the empirical changes in an individual's mentality, his world of objects, the nature of his beliefs and value systems, his moral judgments, et cetera, without presupposing a social-cultural reality and a social construction of the reality in which he is embedded?"

Emile Durkheim maintained that we could understand concrete individual representations only on the basis of an understanding of collective representations. He argued that one could never hope to understand the concrete beliefs and thoughts of individuals by the theoretical manipulation of hypothetical images, feelings and sensations; or in the current terminology, by fractional responses, internalized actions, et cetera. The locus of mind was not in the individual souls of Robinson Crusoes, but in culture, in laws, technology, historiography, scientific theories, et cetera.

This issue, whether one takes human development to pertain to theoretically isolable monads or to the history of mankind, is contaminated by another one — the issue of finalism or teleology. Does, or should, the concept of human development simply refer to changes whichever way they go, or does it presuppose some kind of goal-directed process, some end ingredient in ontogenesis or in human history that serves as both *arche* and *telos*. Is any such goal manifest in actual ontogenesis or anthropogenesis if we simply describe what takes place, without invoking the "cunning of reason" or "the hidden hand of God".

At one time it was firmly believed that Time was the mother of Progress and Perfection. There are still some theories of historical change and individual change that appear to assert that an "organism", individual or social, passes through fixed stages in a certain sequence and toward a certain final stage. Some of you are familiar with these views. Does such a view commit its author to the assumption of an immanent teleology? Must not such a view that there is a certain particular direction ingredient in human nature, to be followed in fixed sequence, be inherently maturationist? And ultimately pre-formist, in the sense that Kant argued that what we call epigenesis is simply pre-formationism transcendentalized?

This takes us to the second and more fundamental polarity, that between "human development" as a descriptive concept and as a normative, stipulative, *a priori* one. If the actual course of human history and human biography does not reveal an inevitable step-by-step movement toward a predestined goal, are we simply to revert to the view that "human development" means any changes in a hominid organism or collective entity, whatever such changes may be? That human development is simply "development"? Are all changes to be taken as developmental, with the sorry recognition, to borrow a phrase from The Life of Riley, that some changes are revolting developments?

Or are we to preserve the telic character of human development by making it a methodological device for the assessment and evaluation of actual changes — that is, by making development a principle or theoretical notion, rather than something in the book of nature which we simply look at and characterize. Unless we operate with such a tacit model of development, unless we assume that certain modes of being in the world are more advanced than others, what are we to make of concepts like regression, arrest, underdevelopment, or disadvantaged child? What grounds will we have for therapeutic or pedagogical intervention unless we know tacitly what development is before we begin explicitly to investigate it?

But once one accepts a methodological teleology as opposed to an immanent finalism, who is to decide what the goal of development is? Who is to ordain the desirable end?

Are we not led to relativize and render conditional the notion of human development, recognizing that the so-called stages will differ depending upon the posited goal? That is, development will have a different character if we make logical operations the goal than if we make esthetics the goal. Or should we go deeper into our intuitions, and farther back in history, to the Renaissance, where development is a regulative principle pertaining to an ideal in which social institutions facilitate man's freedom, and in which the individual comes as close as he can, given his sad finitude, to the realization of all his spiritual potentialities? You can see, as hard as we psychologists have tried to ignore or disdain normative considerations, our whole enterprise must take us back to ethics and theory of value.

COGNITION AND CLASSIFICATION BEHAVIOR **Irving E. Sigel, Ph.D**

When I was asked to write a paper on cognition and learning, my first thought was to define cognition. But I have no definition of cognition. I thought it would be much easier to talk about my work, and to hope that it falls into that category. I do think, however, that the problem of defining cognition is of such central concern at the moment as to be the cause of two things:

First, we have a tendency to be faddists in psychology, and cognition is riding high. Everything you want to do now, like getting money and getting on programs, you should submit under the rubric of cognition. For some interesting reason, it works, which says something, I think, about "cognition".

Secondly, and more importantly, I think, is the fact that this problem has plagued psychologists, as you know, for many years. And we have really avoided coming to grips with it.

This is not a prelude to a definition but merely a prelude, I think, to what I feel is statement of a very real issue: defining the kinds of human processes and human systems to which we are referring when we talk about a cognitive process or product or whatever. In that context, I feel I can say that what we are doing may or may not be relevant to cognition in anything except the traditional sense.

Our interest is primarily in problems of classification or categorization. Whether one wants to put this under the rubric of cognition or under the rubric of affective development or perception I think is moot at the moment. The question will probably need some resolution.

In studying classification or categorization behavior, I subsume a number of kinds of things. But primarily, the concern is with the individual's criteria for creating classes or groupings.

Now, under classification or categorization, either of which terms I am going to be using, the first important point is to identify those conditions under which individuals make particular kinds of classifications, to identify the consistency or inconsistency in such behaviors, and to look at the relationships between such classification behaviors and materials as well as the cultural contexts in which the behavior takes place.

A second concern which relates to the first is the problem of the significance of the materials with which we work.

It is interesting that in psychology we are very well aware of cultural variations and cultural differences; yet in spite of this awareness, we state conclusions to many of our studies and act as though we are dealing with universals, unrelated to cultural contexts.

For example, the work of Piaget suggests that the phenomena he describes are applicable to the human species irrespective of place. Piaget does talk about the environment and the particulars, but I think very often the way *we use* his material is as though they represent universals.

Another relevant example is Witkin's work on cognitive style. The conclusions you find in his book suggest this is a universal dimension. I want to raise the question of the tremendous intertwining of the cultural factors with the phenomenon of classification.

Let us start with the proposition that objects (inanimate or animate) are culturally defined. All physical objects and social events are polydimensional, i.e., our language allows various labels to be used for objects. For our own work this polydimensionality of objects — and I use "objects" now as a generic term referring to all kinds of situations — allows the individual various choices as to the particular aspects of these objects he wishes to respond to or work with. The objects allow, further, for a range of behaviors and attitudes.

Under the rubric of classification behaviors, then, it is significant what kinds of attributes, what kinds of aspects, of this polydimensional object the individual selects as relevant.

In much of our work with children and with adults we have found that there are individual variations in classification behaviors. I will come to the specifics in a moment, but I do want to raise one issue which I think is alse relevant: the patterning that an individual displays in the way he organizes materials seems to account for a variety of individual differences. The funny part about all this is that we tend to — excuse the word — aspectualize or abstract a specific behavior, a specific response, assuming that all other responses in that class are random and, therefore, not very important.

Let me be quite specific. If you take three variables—A, B, and C—which are kinds of classification behavior and you find that two people are very similar on A, but they vary on B and C, do we make the predictive statements about the significance of A as a function of variation in frequency of B & C? I think we do tend to assume that B and C are either random, neutralizing, or irrelevant. We do not pay sufficient attention to the possible significance of B and/or C in relation to A. In effect, we do not deal with patterns of behavior.

I know this suggests that horrible phrase, the "whole person", or the organismic approach, but I do think that classification behavior is a function of many other things in the person both intellectual and affective. The effort should be directed toward such pattern analysis. Let us turn now to another area that needs a more careful analysis — sex differences. Here we lose a lot of information because we employ statistical patterns of analysis instead of psychological. For example, in a number of our studies we found no mean differences or no differences in variance between boys and girls on particular classification tasks. Our statistics tells us that if there are no differences between two groups, you can assume they come from the same population, hence combine them, and go merrily along. However, when we examine the relationship between each of these sex groups and another set of variables interesting differences are found.

Relations for variables vary with sex; for example for boys certain relationships may be positive, whereas for girls they may be negative. The variables may function differently for boys than for girls. In effect, if you find, as you might in a genetic study, phenotypic similarities, does this presume genotypic similarity?

This question has implications for many of the variables we are talking about. If we are to make judgments on what we actually see and assume that this has some sort of generic consistency, we get into trouble, unless the relationships are tested out.

Now, turning to the substantive issues, I want first to make a distinction between certain processes that presumably occur in thought and what we talk about as cognitive products.

I know this is an old argument, but I do think that we have to clarify the definition for what we really mean by process.

Piaget comes closest I believe, when he talks about mental operations. He is one of the few writers who does identify specific kinds of operations presumed to be related in certain classes of behavior — such as logical thought. The specification of process in this sense, I think, has considerable value simply because it gives us a conceptual handle with which to examine other problems.

Well, this concern with classification, the concern with the concepts within which it operates, the concern with the operations, and this for me more interesting problem of the phenotype-genotype business — these form the background for much of our research of the past few years.

We have been engaged in two streams of research. One is, for want of a better term, cognitive style research, and the other is our training work in representative behavior.

Jerome Kagan, Howard Moss and I have over the past few years discovered that if you give people a variety of items to sort and ask them to sort them as they will, you will find certain kinds of consistencies within the indicated classes of materials.

My Ph.D. thesis was in this domain. I operated with a classification system distinguishing responses on the basis of a perceptual-conceptual distinctions. This became confusing especially when one tries to look at the kinds of cues an individual uses as his basis for classification.

What Kagan, Moss and I came to was three kinds of modes individuals used by which they would classify black and white pictures.

One is an orientation toward the manifest, which is Descriptive. Another is a way of relating phenomena in the context which we call Relational Contextual. A third is basically an Inferential approach, which is a more consistent way of looking at classificational categorization, for every item in an array relates the class.

The descriptive orientation is one that tends to classification on a manifest level. If I were to say there are people here with glasses and there are people without glasses, for example, I make two classes by manifest criteria. An inferential response here would be something like: these are all humans, or these are all professional people. I have to make some inference on the basis of either of those statements, but I cannot point necessarily to the manifest criteria.

Now, the interesting thing about these three modes is that they can be translated into concrete abstract in all those forms; or a number of value judgments about their hierarchy and their significance can, if necessary, be made.

Everytime I have reported these findings, I have been asked to give the hierarchy. Each time I have refused, and I have been criticized severely. I don't see any value to getting into the hierarchical issue. I don't know, and I don't care, whether there is a hierarchy. The reason for that lack of concern is that I would rather take a functional view toward these particular modes of classification and to examine the significance of each of these modes in relation to the context in which they are appearing. Therefore, the concern becomes: Which are the most effective or efficient approaches to solving certain classes of problems?

Now, we do know that there are certain developmental changes, if you will. At least, these are changes with age. On a longitudinal sample, children do increase in their use of inferential responses. They decrease in the frequency of use of relational responses, but these still remain.

What we find is that these modes do have some consistency within given classes of material; they show certain developmental changes; and they particularly show relationships to certain kinds of personality characteristics.

If this is true, and if the proposition that the way individuals organize material is related to certain cultural experiences, it seems reasonable to raise the question of how these kinds of behaviors manifest in lower class children.

I hope that our interest in these lower class children is not purely opportunistic. On the one hand, they do provide us with very interesting experiences. On the other, I think we do owe them a kind of responsibility. I say that in relation to Bernard Kaplan's comments about value systems in relation to these categorization phenomena.

I have found over and over again a tremendous value being placed on particular kinds of styles in response. Over and over again, when material is presented to a group, as in a demonstration, the group is manipulated to vote on the goods and bads. Wechsler does it in his tests of mental ability. For example, score one point if the response to one of those animal pairs is that both have a tail. But if you say "animals", it scores two points.

We have built in values and conventional response systems. Teachers do it in the way they teach and thereby shape children to believe there are certain preferred ways to classify. My value system, on the other hand, argues that we want to look at these children functionally; our concern, therefore, is to ask how these children perform in an open situation, with as many opportunities to respond, but where there are no predetermined goods or bads.

It is interesting in even rather mundane things, such as asking children to classify cups and spoons and matches, and so on, the teacher builds in the notion that there is a good classification, and there is a bad classification. I could give you many anecdotes; we have observed teachers who start doing this in kindergarten. We really begin to see that there is a kind of forcing of the child into certain patterns of classification.

Now, on the assumption that objects are polydimensional and that there is no one correct way to organize these materials, our intent was to work with lower class children to help them operate in a variety of ways — in other words, to use any kind of set of cues. The content was not as important as the idea that they could begin to look at objects in terms of their polydimensionality and use any one or more of the criteria as a basis for classification.

Well, when we began to work with lower class children, using pictures, we discovered to our chagrin that we weren't getting anywhere. We began with the stereotypic point of view that they might not have pictures at home, and therefore might not know how to deal with them. And so we asked them, "Do you have TV sets at home?" "Yes, sir, we do." "Do you have magazines?" "Yes."

Of course, I know these are not really reliable statements, but they did know a picture was a picture, having had experience with pictures of a certain kind.

Teachers also reported that the children had difficulty with pictures. So, to examine again the proposition I had made in my dissertation, which was that once meaning becomes dominant, it dosen't matter what the mode of representation is, we decided to check this out again. And having at the right moment a student needing a thesis, we preceeded to examine the consistency of classification behavior among lower class children when dealing with three-dimensional objects which are life size and with representations of pictures of these objects. We made the very interesting discovery that there are distinct differences in the way they deal with each of these sets of stimuli, for objects elicit a different class of responses from those to the two-dimensional picture, although the two-dimensional picture was identical in color and as life size as we could make it. The main thing that was missing was its three-dimensionality. When we presented the same types of materials to middle class children, white or Negro, we got high consistency in the ways they responded to the picture and to the object.

I might add that when we present objects and the pictures in one array and ask the child to pick out all those things that are alike or just the same, we don't have them pick out the picture of the cup and the cup itself. We are trying to learn if they see these as equivalent in any way. We had considerable difficulty in getting many of the children to realize that the picture of the cup and the cup have some sort of relationship to each other.

We tried to get at this in a number of ways. We presented children with pictures and objects simultaneously. "Let's talk about the cup and let's talk about the picture", we said, and so forth and so on. We were trying to get them to say: "Here is a cup and a picture of the cup."

When we reexamined these children after this kind of training period, we found the technique the least effective. It was really confusing. It was as if the representation of the cup has not really blossomed with these kids and they were consequently confused as to what was real.

We then tried a seriation approach, started out with the object and talked about the object in terms of all of its attributes, qualities, functions, *et cetera*, and then introduced pictures. This didn't do much for us either.

The question now arises: What normally accounts for this kind of transition (from separateness to relatedness of object and picture)? We have a number of ideas in terms of linguistic environment of the home, the kinds of reference in the home situation to the past and to time contexts. In middle class homes a lot of time is spent talking with children about what *was*, what *will* be, and what *is*, about the unseen and the unpresent. We raise the question whether with these lower class kids this sort of environmental deficit may contribute to their problem.

But the intriguing question, I think, with implications in many other areas, is this whole notion of transition from dealing with three-dimensional objects to their representations. It is an ancient question that has some important implications in our educational system. There are many kinds of enrichments for all kinds of children. If we really believe in testing out the limits of man's capability, we should regard this area as a very central one, because, with the knowledge explosion and everything else, the way children operate within cultural symbol systems becomes essential to adequate functioning.

One other finding is relevant in terms of the developmental aspects of what criteria lower class children classify objects. In our previous work in cognitive style, we only used black and white pictures, on the assumption that color was an irrelevant one. This time we used three-dimensional colored objects. Sure enough, color becomes a relevant variable! Very often, the child would classify on the basis of color attributes. Even a little tiny speck of red hidden away behind something becomes somehow or other very salient.

So we now had a high frequency of color responses, a kind of descriptive response with a low frequency of form responses, a number of relational responses such as "you put the soup in the cup to stir", "light the cigarette with matches", and so forth, and very few inferential responses.

These are the three general categories that we work with. We found, however, that a number of our children could not verbalize when asked why you group some things together. We decided simply to look at what they did, just observe what kinds of objects they put together.

Using independent judges to answer the question, "Now, what would you think this would represent?" and using our own common sense, which I think was even more important, we found that the nonverbal children tended to organize things on the basis of form qualities such as length, roundness, squareness or shape. These responses were quite consistent and were consistent over large numbers of children.

Now, if these children are "nonverbal" — and the teachers say they are not the more frequent talkers — then we raise the interesting question whether form is actually a more primitive basis on which the environment gets organized, and whether the frequency of color usage is highly influenced by the culture requirements, especially in preschool and kindergarten.

Well, as we made observations in some of the classrooms, we discovered a teacher who said, "You know, these children don't know colors, so we are studying colors."

"So how are you studying colors?"

"Well, this week we are studying red." and we saw the children were painting in red. They were encouraged to wear red clothing. The teacher had red objects around the room. This was the red week. Then, there was a green week.

We asked her, "Where do you end? You know, there is an infinite number of these combinations, shadings and hues."

Well, she said, "The primary colors are all that are important."

Well, that's her business. As a taxpayer, I object.

Does a lot of this use of color which is not really a very salient attribute become important by virtue of the high value we place on it for some reason or other with young children? In terms of the developmental aspects of representation, it seems that the form qualities of objects become very salient and that a lot of meanings, e.g. color, get attached to these in the course of the child's experience with the language and his particular exposures in school, at least for our relatively nonverbal lower class children.

In effect, what we did in our training situation was to provide the children with opportunities and encouragement to decentrate — that is, to look at every object in its multiplicity. Not only did we find changes in their styles of categorization or criteria they used, but we found other effects which were not anticipated. The details are not important for our discussion now, but the principle is. The principle is that when we begin to intervene and manipulate in one area we need to attend the consequences in other areas that may seem very distant, but may be more relevant than we realize.

For example, in this particular study, when the children were through with their training sessions, the teachers reported increased use of language in the classroom, increased positive attitude towards objects and things and toward activity. These, we think, may be side effects.

But the question arises: If we were to get the children involved in more specific kinds of activity — let us say, train them in conservation or train them in reversibility — what might be the consequences of this kind of exposure to other areas of cognitive function? I think this whole problem of economy of experience of one thing in terms of another is something that we really should look at.

In summary, then, I think some of the questions that come out of our kind of work would be:

How does the child come to identify the object? How does he then come to identify equivalent objects, so that he can develop and treat them as a class?

What are the identifying characteristics that enable a child to treat them as a class?

What are the identifying characteristics that enable a child to treat them equivalently or identify them as the same? This question and the transformation of the experience with the three-dimensional object to its representation, both on a pictorial level and on a verbal level, become, I think, very important problems.

In relation to the issues of cognitive style, given children making these kinds of representations, the question we can ask ourselves is: Do these representations, which are somewhat aspects of objects and events, form something of the substance of "style", as a result of an interaction between certain kinds of idiosyncratic experience and certain experiences with the world of objects and events?

I talked about style in relation to classification, which is a *productive* thing. This is the rationale given for making a production. But I wonder if the same principle of preferences for particular modes of action may not also be found in the use of operations. That is to say, are there not individuals who have orientations towards a kind of logical operational kind of thinking, and other people who have other kinds of patterns? If there are an array of cognitive operations, do these not form various patterns within the individual which are used in the service of solving certain kinds of problems?

My last axe to grind or throw is that when we talk about styles or about all the intellectual tasks, I think we should always indentify the class of problem area that we are dealing with. We use words like "problem-solving" across the board. We use words like "cognitive style" or "field independence," as if they will appear in every class of materials under various conditions. I present to you the question: Are there not particular operations and styles that are elicited in particular situations with particular classes of materials in contrast to others? I think it is incumbent upon us to define conceptually these particular areas of problems, and then look at the relationships of those areas to particular personality and intellectual characteristics.

REMARKS OF JEROME S. BRUNER, PH.D.

Editor's Note

Professor Bruner shared with the symposium some views of the philosophical considerations behind the study of development in early infancy and some preliminary results of his own research. Inasmuch as his studies and their results were to be refined and reported elsewhere, I have undertaken, with his permission, to summarize his remarks as follows:

Professor Bruner first pointed out that both evolution and learning must support the socialization of the human infant, by preparing him for participation in a process of *exchange*. This process can be seen to be an element of three major characteristics of human society: (1) the exchange of symbols in language, mythology and art; (2) the replacement of primate and primitive human patterns of dominance and territoriality by new patterns of exchange, mutuality, and kinship; and (3) an exchange of goods and services which supports specialization of human skills and division of labor, with profound effects on the training of the young.

This specialization has both evolutionary and cultural aspects, and these cannot be separated in man. The evolutionary aspect can be traced from earliest primates in the development of precision and power grips in the arm and hand, culminating in man in a situation in which one hand (usually the left) becomes the holder and the other becomes the operator. The associated asymmetry in cerebral function may have facilitated the development of language.

Professor Bruner's research has been concerned with the development of skills in the infant and young child, not only in the hand but in such mental processes as attention. His studies have focused on four principal areas: (1) the development of skills facilitating environmental adaptation; (2) the development of voluntary activity, or the process by which a reflexive activity is converted to voluntary; (3) the question of how a young organism at first capable of just one-track activity becomes able to carry out several things simultaneously, such as punctuating one activity with another without losing the continuity of the first; and (4) the question of how attention comes to be guided by the internal environment rather than by the temporal flow of sensory input from the exterior environment.

With these major concerns Professor Bruner has been looking at four fundamental areas of infant behavior: (1) sucking, the nutritional lifeline; (2) looking and attending; (3) the use of hand or hands for manipulation of the environment; and (4) the general problem of interacting.

A striking feature of the human infant is the degree to which the infant has the ability to use the eye to scan the environment, with no commitment to major motor activity. Movements of the body and head are ballistic, lacking the refinement to come later, but the eye is capable of supporting very early the contact with mother which facilitates interaction and communication. There appears to be a quantity and quality of mother-infant interaction in man which is unlike that in other primates. Both their mutual visual regard and the infant's smile operate as powerful socializers between mother and infant. The infant builds upon these to derive reassurance in new situations and to manipulate the environment through the responses of his mother to his own behavior.

The sucking of the infant has been studied, as an activity that is from the beginning exquisite and energetic. Nipples have been prepared through which positive and negative pressures can be measured and the flow of milk controlled. In the 10 week old infant, comfortable in his mother's lap, sucking has begun to develop a signature in terms of the length of bursts of sucking activity and pauses. With it arranged so that only positive pressure exerted by the infant on the nipple will produce a flow of milk, with just three or four experimental sessions the infant is found to be dropping out negative sucking behavior, with no sign of perturbation. An infant a little older (17 weeks), after ten sessions of being fed this way, may show both positive and negative sucking at the beginning of a session but in thirty seconds will show diminished negative sucking and will in another thirty seconds give evidence he knows he is in a positive sucking session. Other studies show the infant capable of modifying the rhythmicity of bursts of sucking to conform to controlled milk injection, such as the reception of milk only at the end of a programmed second during which he displays sucking activity.

The ability of the infant to attend to two tasks simultaneously has been studied with respect to sucking and looking. Sucking and looking are early related to the bursts and pauses in sucking behavior, the infant looking during the pauses. The very young infant closes his eyes when sucking: The somewhat older infant may continue to suck while looking at an object so long as no attempt is made toward ocular convergence; but when the eye record begins to show convergence, sucking stops.

Both the appearance and the disappearance of objects in the environment may bring a halt to sucking behavior. The disappearance is the stronger stimulus, unless it is instantaneous. A gradual aspect to disappearance (200 milliseconds or more) is an important attention-getting quality.

In learning to deal with two activities at once infants present a phenomenon to which Bruner has given the name *placeholding*. For example, if sucking is disturbed by attention to a visual stimulus, the infant may continue with positive sucking. In a similar way the older infant (7 months) may keep his mouth open while reaching for an object, during the groping activity.

In a further exploration of the relationship between sucking and looking Bruner reported that infants will use sucking behavior to keep a projected image in focus, or will inhibit sucking to achieve the same effect. This remarkable result may be found as early as 8 weeks, and represents a need of the infant for clarity within the visual field.

Professor Bruner closed with the comment that the observations reported deal with early learning mechanisms presenting real challenges to the infant, and that how the infant deals with them may give to him early models of his developing ability to predict or control the environment and may promote his sense of confidence in his ability to prevail over disorder. Success at these tasks is often followed by a smile of mastery from the child. Bruner pointed out that as we speak of the need of infants for stimulation, we should not fail to analyze what it is that a given form of stimulation makes possible for the infant, what kinds of learning there may be, or what forms of differentiation of placeholding or of reintegration of component factors may exist. Knowledge of these things will create a more human environment for infants.

DAVID ELKIND, PH.D.

For me the major message in what has been said today is that the importance of context has been emphasized by each of the speakers today. Bernard Kaplan has emphasized the philosophical context of cognition, Irving Sigel has stressed its social cultural context, and Jerome Bruner has underlined the historical evolutionary context of cognition. The general point seems to be that we have to look at cognition not simply in isolated laboratory conditions, but rather in larger contexts. I think the recognition of the importance of context in the growth of cognition broadens our whole perspective in the cognitive area.

With respect to Kaplan's thesis, I think the message is clear that we have to think about the philosophical presuppositions that lie behind our investigations and be clear about our concepts. I am sure that everybody can go along with that assertion; my response recalls the two old gentlemen who are sitting sunning themselves, one of whom asks: "Why are noodles noodles?"

The other one sort of quizzically rubs his head and says, "They are soft like noodles, they are white like noodles, and they taste like noodles, so they are noodles."

There are different kinds of response at very different levels to such a question as what is cognition or development, and I think it important that we look at our presuppositions.

On the other hand, what bothers me is implicit ought-ness. I am always bothered by "oughts" because they presuppose a value system respecting what people should be doing. I think we see examples of this in a negative way in the current discussions of the slum teacher.

Friedenberg recently reviewed (Saturday Review) two books on slum children in Boston in which the argument ran that the slum teacher is malicious and perverse, with documentation for existence of such attitudes among slum teachers. The particular authors are gifted teachers with these same kids. The "ought" there is: Why aren't we all gifted and doing creative things with these kids?

To be sure, in the best of all possible worlds, that might certainly be possible, but this isn't the best of all possible worlds. Most teachers, I think, are not gifted teachers. They can and will do a job, but I think it unfair to expect the impossible from them. I think we have to take into account both what the child elicits in the teachers, and what the teacher elicits in the child. We cannot expect everyone to conform to the picture of the ideal slum teacher.

The same holds for our research. Ideally, we would like every researcher to know and be aware of continually the philosophical presuppositions of what he is doing. But I wonder whether that ought is practical or reasonable.

With respect to Irving Sigel's paper, I think one of the points that comes out is the fact that social-cultural conditions very much affect cognitive development and cognitive growth. For me, as a Piagetian, the notion of egocentrism immediately comes to mind. We are always egocentric, and never lose our egocentrism. Egocentrism is not something one finds in the elementary school child which then disappears, but something we find in each stage of development. Every new cognitive theory, every new kind of advance in our own knowledge, frees us from a previous egocentrism, but sort of slips us into a new egocentrism.

This egocentrism is always present in our research, so that as soon as we arrive at new findings, we tend to generalize them to all situations and again become lost in an egocentrism. One value of cross-cultural and social class studies is to help us recognize that not all children behave and think in the way that middle class white youngsters growing up in suburbia do.

A second point has to do with the pictures and objects in the lower class child. I have two free associations to that.

Some people working with delinquent lower class kids thought it might be a good idea to give a group of adolescents, confined in an institution and devoid of female companionships, some copies of *Playboy*. The response of these kids was: What the hell can you do with a picture?

Middle-class boys know very well what you can do with a picture.

The other association was some work by Elliot Shapiro in New York City. He comments on the fact that the slum child is a child that grows up very quickly, who never has a childhood; that at an early age such children are already responsible for their younger siblings. They have the symbolic key around their neck, and they grow up so quickly they miss the period of dependency that the middle-class child has. It is at least possible, then, that the facility for dealing with pictures derives from the prolonged period of childhood and the opportunity to engage in fantasy that is so prevalent in the middle class, and that one possibility for looking at some of the differences between the lower class and middle class child would be with respect to responses to pictures.

Finally, with regard to Jerome Bruner's paper, it is hard to argue with hard data or to add to his comments. I am impressed by the way in which he is able to tie up observations on infancy with the social and cultural evolution of society, which is something Piaget doesn't do. It is something that needs to be done and adds a sort of new dimension to these observations.

The message here, again, for me at any rate, is how enormously complex human behavior is, even in the infant. We go blithely on our way studying children and adolescents and think that we can get some understanding of them, and then we look at an infant for a couple of weeks and see that behavior is already enormously complex even within such a very, very brief time span. If nothing else, it makes you a little humble about what you are doing. It reinforces my notion that our stimulus-response conceptualization may not perhaps be the best one for studying human behavior, at least in this point in our research.

HERBERT ZIMILES, PH.D.

I must confess that I sulked through part of Jerome Bruner's description of his work with infants and felt somewhat abandoned because I think we need his help in understanding cognitive development in the preschool and middle years. It would be good to be reassured that this work in infancy is important to our understanding of cognitive development in older children, simply because that is my primary interest. Does this move toward infancy simply represent a new appetite for Bruner or does he see this as an important connecting link to understanding cognitive development in later years?

Listening to his paper, I was once more struck by how enormously detailed are the data that are obtained from the study of infants. In some ways, psychologists remind me of those adults who are tremendously protective of infants, and who, once the children learn to walk, abandon them almost completely. We make such detailed microscopic observations of children during the first year or two of life, and then, once they are three, four, and five, we are content to simply use casual testing devices to study their cognitive development. We seem reluctant to apply to older groups of children the same careful observation procedures and detailed investigation applied to infants. It would be great if people would use the model of infant studies for work with more complex children as well.

I hesitate to air my confusions in connection with Bernard Kaplan's statement because he deals at a level of philosophical analysis at which I am not accustomed to working, and yet, I think it is terribly important. One of the ideas that I got out of his talk is that he was looking for a universal description or characterization of developmental change, one that is different from what we now have as we study individual development. I believe he also said that the idea that the individual organism passes through fixed stages is a teleological notion. Turning to the second issue first, in what sense is our concept of fixed stages teleological if it is based on records of what we observe to be actually transpiring? That is, if we conclude on the basis of detailed study that there are certain fixed sequences of development which take place under the conditions that we make our observations, why is this notion regarded as teleological?

Returning to his thought about development, Kaplan appears to be advocating a much more abstract and all-encompassing idea of development. If development is simply to be regarded as change, are we not losing something by shifting from our established concept of development? We usually think of development as a kind of unfolding or gross process, moving in the direction of increasing complexity or control or magnitude. Thus, development connotes a gradual process, a system gradually interacting with some other event and either absorbing it or gradually being changed by it. A broken arm isn't developed, but a disease is. At any rate, I would like to understand more clearly what the consequences are of his ideas about development since they seem to cause us to lose a set of associations and connotations to the term that are valuable.

I applaud Irving Sigel's emphasis on the qualitative features of cognition and the issues or organization. I think that that is a much more valuable level of thinking about cognitive behavior than one which focuses on the acquisition of discrete responses. There are, however, several questions I would like to pose in connection with his work.

I wonder if there is a hierarchic organization to the sorting strategies and categorizing behaviors he is studying and I am fascinated by the question of why deprived children seem not to be able to categorize pictures but can sort objects. It is possible that these two issues are related to each other. Has Dr. Sigel studied the categorizing behavior of middle class children a little bit younger than the deprived children whom he finds unable to sort pictures? The important question here is whether it is as a result of their distinctive environmental background that young deprived children are able to deal effectively with objects but not pictures, or is this pattern of behavior characteristic of all children at earlier levels of cognitive development? One way of answering this question is to see whether or not this pattern occurs universally, but at different points in development for children of different backgrounds.

This ties up to the question of the hierarchic organization of the different strategies observed by Sigel. I think that these different modes of categorization can be examined to determine which of them relate more to modes of cognitive functioning which have survival value in our society. It is conceivable that one or the other does contribute more. One clue along those lines is the nature of the changes which take place with age in response to this kind of task. One way to organize hierarchically the categories in younger children, is by observing which response patterns dominate the responses of older children.

Sigel cautions us that the work that he has done is limited to the kinds of stimuli that he uses and the kinds of situations with which he works. And that, indeed, is an important caution. The question, however, is how much generality is there to the findings that he has been obtaining? It will doubtless be a long time before we know the answer to this. But if it is true that the findings change with variations of stimuli, and with the conditions under which he is working, then obviously there is a tremendous amount of work yet to be done. Under such circumstances we would need a comprehensive inventory of behaviors evoked under different conditions. This would pose a much less attractive situation than if he could demonstrate that, indeed, the way children behave in this situation is very revealing of how they perform in a variety of other situations. To obtain evidence of generality, however, Irving Sigel would have to be working with a whole new set of materials at the same time that he is trying to get some mastery over the ones he has invested in. It probably also means reviewing his way of classifying the response his test evokes and re-examining the coding procedures to make sure that they represent the most useful ways of differentiating the responses that children give to these tasks.

Finally, I want to say something about the question of training, which Sigel mentioned he had used as a strategy. I agree with one of his final points that there are a lot of side effects to a training procedure, and it is important to know what they are. When you train a child, you are influencing him in a variety of ways other than the ones that you think you are. And I think often we lose sight of that. I am concerned about the tremendous number of small training studies recently conducted by psychologists which have led them to turn to educators and make claims about the feasibility of teaching certain concepts or the greater efficiency of one method of instruction over another. Usually, the training procedures that are used are superficial, the psychologists not having demonstrated the generality of their training. Sometimes what they are doing is simply teaching children to parrot certain responses. It isn't surprising, then, that they obtain changes in behavior. In addition, as Sigel has pointed out, these trainers often lose sight of the other consequences of the training procedures. The process of teaching children has to be looked at as one involving multiple goals and multiple influences. The narrow focus on a single goal may overlook important side-effects and their interaction with long-term goals.

DISCUSSION

KAPLAN: Let me try to answer first one question about my notion of development.

I think the customary way to deal with developmental psychology is to treat development as a subject matter. Developmental psychology becomes essentially a branch of natural history. What I am suggesting is that I am more concerned with development as a theoretical concept.

If we look back into the history of science we find that Aristotle, in developing his theory of motion, refused to deal with any kind of motion that continues indefinitely because he said that takes us out of what we actually observe.

What we actually observe is bodies in motion, starting and coming to a stop. Aristotle's concern simply with what actually was the case led him to ignore the possibility of positing an ideal, which is, of course, what Galileo did when he turned classical physics on its head. He said, in effect, "we can't understand the actual without positing the ideal."

I am suggesting that we cannot examine actual phenomena of change without positing an ideal of what is meant by development.

The same thing might be shown in a more empirical way. Chomsky has said, "We cannot understand language by taking performances of individuals and examining them and trying to draw inductive generalizations. We have to elucidate the ideal language of the ideal speaker."

This is essentially what I am suggesting when I talk about the necessity for positing an ideal of development. I am not suggesting that development is mere change. Nor is it historical change. We know that we have a *tacit* notion of development which allows us at any time to talk about regression or underdevelopment. Now, we have to ask ourselves, "What is this tacit notion of development?"

Zimiles defines development as meaning increasing differentiation and hierarchic integration. I think you can easily assimilate most of Piaget to that particular notion. This is development, whether it occurs actually in ontogenesis or not.

What I am really getting at is that you disentangle the notion of development as a meaning from what it applies to. Then, you apply this notion all the time in assessing actual change.

The issue was raised as to how can I talk about a fixed sequence as applying immanent teleology. In order empirically to discover universalized notions, you must examine not only a given group but every group, not leaving out those who you say are mentally retarded or culturally deprived. If you were to exclude such groups you would be introducing adult notions as to where the normal fixed sequence does not occur.

Insofar as you posit a fixed sequence, you obviously imply something in the process that leads in a certain direction. It is teleology. It is not an external teleology; it is an immanent.

I have no objection to that. We say it is an ideal of natural order that individuals move in certain directions. That is what we are positing. They move in a certain direction, for example, towards the development of mentality. But some individuals do not. We then have to introduce Sell's law to account for deviations from the ideal. That's exactly how we proceed.

I will argue that Piaget has proceeded this way and Freud has proceeded this way, always presupposing some kind of norm. I would say that Piaget could have come to his notions of development without ever examining a child.

If you move toward a norm or goal, what steps are presupposed? Does the child actually go in this way step by step? Actually, if you want to see such propositions tested, you would expect the investigator, Piaget in this instance, to use an enormous sample, which he has obviously not done. His American friends have done that.

SIGEL: David Elkind's comments about his experience with delinquent boys reminds me that an analyst asked me recently whether I would prefer a picture of a beautiful woman or the three-dimensional woman. I thought the question posed a problem of middle class morality in the sense of temptations.

It is true that the object and the picture are different. The important point from the standpoint of our work is really to differentiate when it is appropriate to respond to the picture in a certain way and when to the object.

I would be disturbed if these delinquent boys were reacting to the picture in *Playboy* exactly as they would react to its three-dimensional equivalent. But the fact that the boy is capable of certain kinds of common responses becomes important.

In effect, I am asking the question as to how we deal with representations when we know that important relevant classes of real behavior are appropriate in one context and not in another.

This relates also to some of Herbert Zimiles' comments. I am sure I know why he is asking the question about hierarchies.

We get very much built into value systems which have hierarchical notions. This leads into the notion of development having hierarchic integrations. What I want to inject is the question of relevance. There are times when some of these hierarchical integrations are dysfunctional, other times when they are functional. Our problem is to begin to define the classes of conditions or situations over the environment which will then tell us something about it.

I would certainly not want or expect a poet to create his poem in the same way that a logician will develop a syllogism. These are different requirements at different levels of awareness, if you will, or of functioning. And it is these kinds of distinctions that I think become important. All of us, for example, would agree that we don't want the child to be taught art the way he is taught science. I think this epitomizes the issue I am trying to point to.

Now, the fact that the individual has available to him an array of responses, along with awarenesses as to when these are appropriate for solving particular problems, this, to me, becomes the central and exciting issue. When we ask about the question of generality of these responses, therefore, it behooves us to begin to look at certain environmental or contextual requirements. We have the problem of conceptualizing this kind of environment.

In psychology today, we always talk about the environment. And yet, if we look at conceptualizations about that environment, we find that psychologists have contributed extremely little. We have taken such notions as social class from the sociologists, but we don't know the relevant ingredients of social class phenomena that make for differences.

I am making a plea for conceptualization. In Jerome Bruner's work with the infants, for example, the environment is highly constrained and constricted in relation to sucking. It is highly constructed in the relationship between sucking and eye movement. It becomes very important, then, to ask what the effect would be of an environment which has other distractors of a personal or an affective sort — just sheer noise.

The first step, I think, is what Bernard Kaplan is talking about. Unless we get to the tying in of certain environmental demands in a conceptual way and articulating these, we will lose what seems to be a very significant element in the interaction of the individual in his environment. It may be true that we will have to go to a wide array of stimuli or objects or events before we have some degree of generality. But I would rather be a little bit more conservative than presume that just because I study nonsense syllables, I have discovered a law of learning or that just because I use particular kinds of environmental common factors or objects in the way I do, I can suggest the child will have consistent responses to all classes of objects.

This becomes the dilemma and the challenge.

ZIMILES: It seems to me Irving Sigel implied he had some ideas about the kind of categorizing behavior he would like to see or expect to find in a logician and the kind of categorizing he would expect to see in a poet. Why not have some ideas about the kinds of categorization you would expect to see in a child at a particular age?

SIGEL: I am not implying that. What I am asking for, really, is a critical appraisal of each of these styles and how they relate to the cognitive tasks that are before the child. I am not at all implying that a hierarchy can be established and that we should then rush out and tell teachers how to train children. But it seems to me we cannot simply say there are apples and oranges out there that are interesting. I think we have to move them to a new level of analysis.

ELKIND: I would like to say something, not in defense of Piaget as I am not here to praise or bury him, but with regard to the notion that he had a concept of development before he ever began to investigate. I think this is entirely true. Piaget has always seen himself as a man in the middle. We have arch-empiricists and the arch-nativists on either hand; Piaget's notion of interaction has always dominated his observations. You always have a feeling he knows before he observes the child what he is going to observe.

I think that is alright. We always have to have guiding concepts to direct our observations. I am not sure in certain stages in the development of a science you may not need a relatively amorphous concept which directs your observations; its clarification comes in the process of the research itself. You can't have a clearly defined concept of development or anything else until all the data are in.

There is a constant redefinition of concepts as the science grows. I am not sure, really, whether having a completely articulated concept of development is a necessary thing, or whether it might even be an evil, in the sense it leads to predetermination. A certain flexibility, a certain looseness in our definitions in a certain stage of our research is perhaps a valuable thing.

SEYMOUR WAPNER: In contradistinction to David Elkind, I believe and I think Bernard Kaplan does also, that everyone working in any area has certain predispositions in the first place. A critical problem is recovering them, making them visible, and knowing what they are.

I would appreciate it very much if, to get some closure to this morning's session, there could be an examination of what the relationship is between what Kaplan has indicated as a concept of development and what Jerome Bruner is doing in his work and Irving Sigel in his.

For example, if development means movement toward an ideal, with respect to, say, differentiation and hierarchic integration, is this an assumption that Bruner accepts when he poses as a crucial problem in infant development the question of how two systems get integrated?

This is the kind of thing I want a specific reaction to, both from Kaplan and from Bruner. I want also to see the relationship between Kaplan's comments and Sigel's work. Is there an acceptance of this idea, or isn't there? What is the presupposition? If we get an answer to these questions I will go home a little more satisfied.

BRUNER: Not only do I find the concept of hierarchy essential, but I simply do not know any other architecture of complexity that is possible. How in the world can you ever get two functions to operate together except by the following system: one in which you put both functions into a free structure where a decision will take place as to whether one thing will happen or another, which decision is a switching or shunting function that is basically hierarchical. The switching or shunting function gets to be a subroutine in the way the necessary decisions are determined, or the result of something that happens higher up in the hierarchy.

The only other way in which this might happen is through a kind of rhythmic interdigitation. You don't find rhythmic interdigitation taking place very much this high up in the animal kingdom. Some of the early integrations in infancy between swallowing and sucking may represent this kind of integration of two systems, but they are gone by the first month or two.

I would like to make one other comment while I am here. For those who worry with Herbert Zimiles that study of infancy may automatically mean one has deserted the study of the middle years of childhood, let me make the following strong plea.

One of the things that we have a great tendency to do because of the intrinsic extraordinarily difficult nature of our field is to become expert at a particular age. You become very expert on how to cope with children of that age in order to get them to work in your experiments.

This is, however, one of the sources of a kind of applied psychology that troubles me, a kind of applied psychology of development which constitutes premature disclosure. I have a feeling we ought to introduce a kind of interior sabbatical. Those who work on little children should shift to work on later children, and those who work on infancy work on I am not quite sure what.

This type of thing is essential. I feel it very strongly in terms of my own history. When we were working on older children, they would come in with beautifully formed strategies of coping with situations. We wanted to get underneath those. In getting underneath them, my not so secret objective is to see whether we can find out something about the precursors of species, specific things in man before they start showing themselves — the two most striking being language symbolism on the one hand and tool using on the other.

My last concern is a little more evanescent and has to do generally with the problem of how in the world we can manage to suppress a basic kind of aggressiveness and sexuality and a tendency toward possessiveness in territoriality in man and substitute for them the predispositions to live a kind of kinship-organized society.

THOMAS O. KARST: I would like to ask Bernard Kaplan why, if you want to make development a purely descriptive kind of dimension, do you still need the ideal notion?

KAPLAN: I am not trying to make development a purely abstract notion. I am trying to free it from such particular content as assuming that its goal is logic. I am saying, actually, it is the differentiation of all of the dimensions of the human experience in which intellection is only one.

This is the tacit notion: we explicate; then, we treat it as an ideal which obviously none of us are ever going to satisfy as individuals. These ideals are necessary only in order to assess actual change.

KARST: As Irving Sigel pointed out, the ideal depends on the situational context. The higher way to function depends on the situation, not on the ideal notion.

ELIZABETH GELLERT: I would like to ask Dr. Bruner a question about his notion of holding operations. Can you tell the difference between the baby's open mouth as a holding operation and as a result of the fact that the baby had just had no stimulus to cause him to close his mouth? How do you come to the interpretation that he is engaging in a holding operation?

BRUNER: Let me give it to you in terms of a specific example.

One of the things we have discovered is that in the stage right around five or six months, when the baby is first using the kind of pumping and reaching out with the two hands, the mouth opens while he is attempting to reach. If while holding out the ball, I put my finger in the baby's mouth, the baby closes on my finger and stops his reaching activity. The whole reaching act is primed to bringing the object back to the mouth. So the mouth opens.

We have also found that when the child starts using his first tools of inorganic kind, the cup, at seven or eight months, while he moves the thing towards his mouth, he keeps his mouth open. The interesting thing is that the older child only opens the mouth at the point where the lift starts rather than when the reach starts.

The point of opening will go back to an earlier point in the sequence if there is confusion in the situation. That is one of the things that makes me respond so warmly to Irving Sigel's point. If the mother is saying something and I am holding a camera to take a picture, or something else like that, the child doesn't quite know what is going on. In that noisy situation you can practically reproduce in a 27-month-old child a mouth opening pattern in the place of a 28-month or 14 or 10-month response. You have to be awfully careful what random behavior is going on. The usual way is to find out whether there is an initiating circumstance and more definitely a specific terminus to placeholding.

I tend to think of placeholding as one of the important things in the formation of hierarchy. A placeholding operation is basically an address in a hierarchy. I mean it in just so many words. I think it may be particular in some extent to human infancy. We are not going to find it to the same extent in chimpanzees. It is part of the business of being able to plan in the way that looks human.

PART V ADOLESCENCE

Papers by

Elizabeth Douvan, Ph.D., Department of Psychology, University of Michigan
David Elkind, Ph.D., Department of Psychology, University of Rochester

Respondents

George Spivack, Ph.D., Research & Evaluation, Community Mental Health Center, Hahnemann Hospital
Walter Emmerich, Ph.D., Educational Testing Service
Robert S. Morison, M.D., Department of Biology, Cornell University
Milton J. E. Senn, M.D., Child Study Center, Yale University

Two views of adolescence are presented: Elizabeth Douvan's finding that American adolescence does not appear to conform to a prevalent stereotopic notion of its stormy character, and Albert Solnit's divergent view. David Elkind and George Spivack present some observations on adolescents in trouble. Robert Morison and Milton Senn comment on larger issues to which our society must address itself if the being and becoming of adults is to have lasting creativity and security.

AMERICAN ADOLESCENCE Elizabeth Douvan, Ph.D.

In the course of our research on the adolescent experience, my colleagues and I came upon a remarkable discrepancy between theories of adolescent development and the empirical evidence from our own studies. In checking further into research completed during the past fifteen years, we found that the discrepancy was not original or attributable to the particular nature of our findings. All major studies of the adolescent population have reported that most American adolescents make the transition from childhood to adulthood in a process characterized above all by its temperateness, a process in which child and parent join in a collaborative effort to extend the child's choice and autonomy, the child asking for moderate increases in freedom as he grows from 12 to 18, and the parent responding to his requests in a spirit of concern and commitment: granting reasonable requests and supporting the child with specific training in self-governance and choice. The large majority of American adolescents report their family interaction — and these reports are consistent whether they are elicited by direct questions or by indirect and projective instruments — to be marked by respect, concern, active communication and a striking degree of harmony.

To say that we found the overall descriptive results of our studies disappointing and dull is to oversimplify and exaggerate our reaction. But like most things that are thoroughly good, the picture is pretty bland. Like pablum, it had nothing offensive about it, but little either that could enliven one's interest or taste.

The contrast between the empirical findings — our own and others' — and the theories, was more stimulating. For here it seemed was a real curiosity: that theory should be so unresponsive to a continuous flow of negative evidence. Whether it bears testimony to the hardiness of theory or to the skepticism of social scientists, or to their own stormy adolescent experience, the theorists hold with great unanimity that adolescence is a period of sharp and extensive struggle. The biological and instinctual changes of puberty upset the psychic balance won at the close of childhood and held through the latency, and throw the child once more into an intrapsychic struggle for control. The impulses break through defenses that were never designed to manage adult sexuality, and the ego struggles to rebuild under siege. On the interpersonal scene, the family becomes a hothouse. The child's sexual ascendancy, the reemergence of Oedipal themes, infuse family relations with regressive dangers. The parents on their side are threatened by the presence of another sexually mature member in their midst and by their own impending loss of dominance. Resistance and rebellion are met by increasing efforts to control the child, and he runs from the family to the safety and support of the peer group, a haven for self-exploration and self-definition. I have exaggerated the drama a bit perhaps, but one thing I have not exaggerated: all theories see adolescence as the time when the child must cut and run, when he must detach from the family and case his lot with his own generation and through a process of conflict become his own man.

It simply isn't so; not at any rate, for the large majority of cases and here, we suspect, lies the source of the discrepancy between theory and data. Our theories have derived from intensive studies of two highly visible but numerically small segments of the adolescent group, the acting out delinquent subgroup and the neurotic, upper middle class, sensitive, introspective adolescents who find the transition to adulthood unbearable and seek professional help. But the modal pattern, the way of most American youngsters, is neither to act out nor to suffer the strains and conflicts, the guilts and anxieties of neurosis.

The traditional view of adolescence has a good deal to recommend it, but our reading of interviews with adolescents suggests that it needs revision in some important particulars if we are to apply it to the middle majority. This view exaggerates the degree of conflict between parent and child; it wrongly estimates the autonomy issue; and it misinterprets the role of the peer group. The normative adolescent tends to avoid overt conflict with his family. Now this is not to say that conflict is not present; but it is largely unconscious conflict, those under-surface resentments which do not necessarily liberate or enlarge the personality, but which, paradoxically, increase the child's docility toward his parents. Even when we do find overt conflict one senses that it has an "as if" quality to it, that it is a kind of war game, with all the sights and sounds of battle but without any blood being shed. More often than not the conflicts will center on trivia, on issues of taste — clothing, grooming and the like. One can argue that these issues are trivial only to the adult, that they are, however, of great symbolic importance in the adolescent's quest for autonomy. True; but one can reply that parent and child play out an empty ritual of disaffection, that they agree to disagree only on token issues, on teen issues and in doing so are able to sidestep any genuine encounter of differences.

Much the same is true of autonomy. There are autonomies and autonomies. The American adolescent asks for and is freely given an unusual degree of behavioral freedom — the right to come and go, to share in setting rules, and so on. But it is far more problematic whether he asks for or achieves a high degree of emotional autonomy, and it is even more doubtful that he manages much in the way of value autonomy. Indeed, the ease with which the adolescent acquires behavioral freedom may tend to interfere with the achievement of emotional and ideological freedom, for reasons we shall turn to in a moment. As to the peer group, its supposed functions — as an arena for the confrontation of the self, for the testing and trying out of identities — are present for many adolescents, but for many more the peer group is used for the learning and display of sociability and social skills. The peer group, with its artificial amusements and excitements, often acts to hinder differentiation and growth.

This is especially evident in the area of values and ideology. The traditional idea of the adolescent experience has it that the youngster becomes involved in an intense concern with ethics, political ideology, religious belief, and so on. The moral parochialism of early childhood was thought to be broken by the moral fervor and the incipient cosmopolitanism of adolescence. The youngster's need to detach himself from the family and its view of the moral and social order, his need to redo the ego-superego constellation, his need to find new and more appropriate ego ideals, his need to use ideology as a solution for instinctual problems — all these needs came together, so it was thought, to produce a value crisis somewhere in the course of the adolescent career. This pattern can be found in adolescence, but it is found in a bold, sometimes stubborn, often unhappy minority. Our interviews confirm a mounting impression, from other studies, that American adolescents are on the whole not deeply involved in ideology, nor are they prepared to do much individual thinking on value issues of any generality. Why is this so? We would guess that this is true because to think anew and differently endangers the adolescent's connection to the community, his object attachments, and complicates the task of ego synthesis.

We can sum up in the language of personality theory. The inherent tensions of adolescence are displaced to and discharged within the matrix of peer group sociability. Intrapsychically the defenses and character positions adopted are those which curtail experience and limit the growth and differentiation of the self-repression, reaction-formation, and certain forms of ego restriction. These two modes of dealing with inner and outer experience join to produce a pseudo-adaptive solution of the adolescent crisis, marked by cognitive stereotypy, value stasis, and interpersonal conformity. It is a solution which is accomplished by resisting conflict, resisting change, resisting the transformation of the self. It settles for a modest resynthesis of the ego — closely along the lines of the older organization of drives, defenses, values and object attachments. It is characterized by an avoidance of identity-diffusion through limitation.

These rather dismal conclusions on the contemporary adolescent character are akin to those stated by Edgar Friedenberg in his brilliant book, THE VANISHING ADOLESCENT. Adolescence can achieve a decisive articulation of the self. Nowadays the youngster, in his words, "merely undergoes puberty and simulates maturity.". If this amiable but colorless form of adolescence is indeed a new thing in our country, two critical forces have helped to produce it. First, there is the extraordinary attenuation of today's adolescence. And, I would like to suggest that the media and particularly television have brought the larger culture into the child's life long before adolescence and have eliminated another important discontinuity that used to be managed at adolescence, the break from the private protective parochial home to the cosmopolitan challenge and dangers of the larger world.

Given the long preparation required for advanced technical training, given the uselessness of the adolescent in the labor market, parent and child settle down for a long, long period of time during which the child will, in one way or another, remain a dependent being. Traditionally, adolescence has been the age in which the child readied himself to leave home; and when we read accounts of adolescence in the earlier part of this century we very often note between father and son a decisive encounter, a decisive testing of wills, in which the son makes a determined bid for autonomy, either by leaving home, or threatening to do so, and meaning it. The adolescent then had little of the freedom he has today; he was kept under parental thumb, but he used his captivity well, to strengthen himself for a real departure and a real autonomy. Nowadays the adolescent and his parents are both made captive by their mutual knowledge of the adolescent's dependency. They are locked in a room with no exit, and they make the best of it by an unconscious *quid pro quo*, in which the adolescent forfeits his adolescence, and instead becomes a teenager. He keeps the peace by muting his natural rebelliousness, by transforming it into structured and defined techniques for getting on people's nerves. The passions, the restlessness, the vivacity of adolescence are partly submerged and partly drained off in the mixed childishness and false adulthood of the adolescent teen culture.

EXPLOITATION IN MIDDLE CLASS DELINQUENCY David Elkind, Ph.D.

I want to relate some experiences I have had over the past four or five years working with middle class delinquent young people. I do not have research data in the strict sense; all I have are some ideas that have come to me after seeing a large number of these kids. This is, after all, the beginning stage in most research. One starts out with observations and conceptualizations and then moves into more detailed kinds of studies. So what I am presenting today is a kind of theory, or better, a kind of conceptualization of what seems to me to be one of the major factors in middle class delinquency.

The opportunities that I had to observe delinquents were very fortunate because they occurred not in the clinic setting, but rather in the actual court setting. I sat in the hearings with the judge and probation officer. I could ask questions. Often, the judge let me do the questioning because he was a modest fellow who did not feel threatened by a psychologist asking questions. So I was there when the kid had just been brought off the street or from the jail and we could see him in transit, in peak experience. It was an opportunity to deal with these young people at times that we ordinarily wouldn't get to see them and under extraordinary circumstances.

First of all, we need to distinguish between at least three different groups of middle class delinquents. One group of youngsters one sees usually just once in the court. These are generally well put together kids, who haven't been in trouble before and often get into trouble simply as a kind of lark. One group, for example, stole a stop sign from a busy corner, and there was a serious accident as a result. Such adolescents are brought into court, and often one experience with the judge and the probation officer is enough to keep them from getting into trouble again. Usually these young people are never seen again because this one scare is enough to keep them out of serious trouble in the future.

There is a second group of youngsters whose delinquent behavior is quite clearly a manifestation or symptom of a severe emotional disturbance: for example, a boy who is shooting up the school, or shooting up windows in a house. In such cases you may discover there is a girl living in the house about whom he has had fantasies and that he has had longstanding emotional problems. This kind of a case is more a psychiatric problem than a judicial one.

But there is a third group of adolescents, and these are the ones I want to talk about this afternoon, who have a long history of difficulties with the law, and who are known to the police officers in the community from a very early age. They start getting into trouble, and then gradually it gets more and more serious until finally some formal action has to be taken by the district attorney's office. Such action usually precedes their being seen by the court.

Now, in order to set the stage for what I want to talk about, I would suggest that one useful way of looking at middle class families is to think of their interaction in terms of a contract that represents an implicit bargain between parents and children. The contract reads, I think, something like this: The parent says, "I am going to provide you with physical and emotional necessities of life, and you on the other hand are going to abide by the middle class mores. You will go to school; you are not going to get into trouble; you are going to get good grades." These bargains are seldom verbalized, but the contract is implicit and it is considered as binding.

In all families, the contract is broken occasionally both by the parents and by the children. But such temporary lapses can be tolerated. What you find in the family of delinquent youth, however, is a longstanding violation of the contract by the parent. The contract has been broken in the sense that the parent has put his or her own needs before those of the child for a long period of time while the demand continues that the child live up to his part of the bargain. Though the parent violates the contract, he or she demands, nonetheless, that the adolescent continue to abide by middle class mores, continue to behave in appropriate fashion, and get good grades. At this point, I think, the situation is analogous to what one finds in industry and business when an employer is not willing to pay the going price for the output he demands of his workers. It is in this sense that we can talk about parental exploitation.

The ways in which parents can exploit children are almost infinite, but for purposes of presentation we can group them within a relatively few categories. What I would like to describe are some of these general types of parental exploitation which I saw initially in Denver but which are equivalently prevalent in the cases that I have dealt with in Rochester.

Now, psychoanalysts have talked about middle class delinquency, but primarily in terms of vicarious satisfaction of instinctual gratification. And that is one kind of exploitation, but it is only one, and (in addition to exploitation at the level of id impulses) there is also exploitation at the levels of the ego and of the superego if one wishes to talk in those terms.

Let me begin by giving some examples of vicarious satisfaction of impulses before going on to the more cognitive varieties.

There was an attractive girl who, when I saw her, had been picked up at Lowery Air Force Base for taking on a whole squadron of guys in a trailer. On talking with the mother, it became quite clear that this woman was asking for a kiss-by-kiss description every time her daughter came home from a date. Then, with her needs vicariously satisfied for a moment she would rage at the daughter and call her a whore. It was evident that this mother was pushing the girl into delinquent behavior to satisfy her own sexual needs. To illustrate how the mother sexualized every relationship, I need only mention that after the girl would come from seeing me the mother would ask her how far she had gotten with the psychologist. The father was unbelievable. All these things were happening to his daughter and the only thing he could talk about was his sore toe. This girl told me, "I have the name, I might as well play the role." She ran away with a soldier who didn't marry her after all and ended up "tricking it" in downtown Denver.

There is another type of exploitation which is similar, but which might be called ego-bolstering. All of us, I think, are eager to have our children perform well, do well in school, do well in athletics. I think that is a healthy attitude.

What you find in ego-bolstering exploitation, though, is an exaggeration of this tendency to the extent that the interest in the child is subordinated to the need and interests of the parent. In other words, you find the parents trying to get these kids to reach heights of achievement in order to bolster their own flagging self-esteem rather than because the young person's best interests are in mind.

For example, there was a father who had a handsome 17-year-old son. The father gave the boy money and encouraged him to drink and to frequent so-called "massage parlors". He was picked up during a raid and the police brought him home because he was still a kid. The father answered the door. And when they told him about where they had picked the boy up, he got very angry and upset and said, "Why aren't you out catching crooks? Why are you bothering my boy?"

This same father would go to work and brag about his son being a chip off the old block. "My boy can do all these things." So this is another kind of exploitation. It is not vicarious satisfaction of instinctual needs but rather an attempt to bolster the ego of a man who, in his own eyes, was a failure at work, and who hadn't achieved the recognition he thought he deserved. He was trying to prove himself through this lad and exploited him by putting his own needs ahead of the youngster's.

There is another kind of exploitation that you sometimes see in married women who have been divorced or who have been widowed and who are young and attractive and who have teenage children. Something happens to these women. They live in "good" neighborhoods, they have nice homes and have been involved in the community. They have done a lot in PTA, the church, the symphony orchestra, etc., the usual middle class wifely activities. But something happens to some of these women with the divorce or with the death.

I have seen a number of such women now who suddenly take up with some guy who is the antithesis of their husbands. I don't know whether we can work out the dynamics, but that isn't important here. They bring him into the home, do not explain to the children what is going on and demand that the children accept the situation without any question and without any attempt to deal with the child's feelings. They demand, moreover, that the child condone their behavior.

One divorced woman, very attractive, who lived in a very expensive neighborhood, brought in this guy whom the daughter described to me as a kind of a Marlon Brando type, with torn shirt and a ski bum history, who, every time the mother was out of the room, would begin pawing the daughter. The mother knew that this was bad for the girl, everybody told her this, but she was hung up and while she could acknowledge intellectually that her behavior was disastrous for her daughter, she found it emotionally impossible to break with the fellow. The daughter, on her side, had to explain this "boarder" not only to friends, but to neighbors who would ask what was going on and who would complain about the noise and parties.

Eventually, the daughter got pregnant. The mother found this incomprehensible because her child had come from "such a good home".

In another case the husband died very tragically on a ski slope. The mother took up with a fellow with whom she drank in the afternoons and to whom she gave a lot of money. The son, who was doing well in school and who was an all-around athlete, would come home, and the mother would lock him out, scream at him to go away. And the son had to explain this behavior to his friends. After a month or two of this, the boy ran away to Mexico. The mother brought charges against him. She couldn't understand why her son had run away from his "good home".

Let me emphasize that I think there are certain real and legitimate needs that such women have. And one can sympathize with these needs. Yet the result is a variety of parental exploitation. It is a kind of exploitation in which the parent demands that the child condone her behavior. In such cases the parent uses the child to assuage her own feelings of guilt.

In other cases, you find mothers bringing home illegitimate children, again without any explanation to the adolescents in the home. Such women say in effect "accept my behavior without question". Clinically these are some of the most intransigent, rigid women I have ever seen. They exploit their children by using them to support their own self-rationalizations and justifications.

Still another type of exploitation is what might be called slave labor exploitation. Early in this century it was appropriate for kids to work in family businesses for long hours. Such work still may be appropriate in some families today. Moreover, it seems to me that when young people see justification for their being used in a family business and so on, there is no real problem. It is only when they feel that they are being used that problems arise. A case in point is the mother who gets the older daughter to take care of the younger children every afternoon so she can go out drinking with her friends. Under these circumstances the mother deprives the daughter of her friends for selfish rather than reality-based reasons.

One of the most extreme examples of this form of exploitation I have ever seen is a father who owned a motel, and who was doing very well, indeed. He had a son who worked with him and who took care of the rooms and cleaned up around the place and helped in the kitchen. But the unbelievable part was that the son spent every Saturday morning taking the lids off and flattening empty food tins from the coffee shop that was part of the motel. The father paid for rubbish disposal by volume and, therefore, by flattening these cans, the boy would be lessening the father's cost of rubbish disposal. This young man had very little time to spend with his friends, much less to do homework or to pursue hobbies. His father could not understand why he was truant.

This wasn't necessary. The son knew it wasn't necessary. The father could well afford to hire people to help in the business and the money saved by flattening the tins could hardly have been worth the bother. Since the labor was free, however, the father took advantage of it.

I want to emphasize that a certain amount of work at home or at the family business is reasonable. Indeed, when their help is genuinely needed this gives young people a sense of purpose and usefulness that is very healthy indeed. It is only when parents have no financial need for their children's help or when they go beyond the bonds of what is reasonable that young people feel they are being treated as slaves.

A final type of exploitation is one that you find in judges and rabbis, ministers, school principals. What happens in such cases when the children of prominent men get in trouble? Generally, the father's need to protect a certain image within the community is such that he demands that his children conform to middle class mores to a much greater extent than is really necessary. That is, he demands that they behave so as to maintain his social image.

And, again, it is not that the children resent restrictions or resent having to do certain things for their parents that causes them to get into trouble. It is, on the contrary, the feeling of being used, of having to do these things, not because they are good for them as individuals, but because they are good for the parent. In all of these middle class children it is this feeling of being used, of being exploited by their parents, that appears to be the common motivating factor in middle class delinquency.

To illustrate, a judge's son got into a lot of trouble the year the father was running for re-election. The boy killed an elderly man on Christmas eve and left the scene of the accident. He was picked up several blocks away trying to unbend the dented fender that had hit the old man. It was a mess. This boy had been getting in trouble all along, however, and it had been shushed up. This time they sent him off to a military school.

Certainly there is no excuse for his having been drunk or for his having left the old man in the street. The father is not entirely responsible for that. On the other hand when a father demands, "You maintain my social image for me," he begins to exploit his child and to set the stage for delinquent behavior.

There are other types of exploitation, including the use of the child as a weapon against the other parent, but these few examples will perhaps suffice to illustrate what I mean by parental exploitation.

Now if you have a worker in a factory situation and he is being exploited by his employer, there are at least four different things that he can do. He can quit. Or he can go on strike. Or he can sabotage the plant. Or he can just submit to the exploitation. And you see these same patterns in kids. Some of them quit. They quit the family psychologically. They simply won't have anything to do with the family, or they quit and take off. They leave town; they run away.

Others go on strike. That is, they simply refuse to obey parents. They become what we call incorrigible children. They may stay with the family, but they stay out late at night, they go with a group the parents don't approve of, they go on strike against any conformity to middle class mores or parental wishes. Other young people attempt to sabotage their parents, they vandalize, steal cars, take drugs or get pregnant. More importantly, they get *caught* and cost the parents tremendous amounts in bad publicity, money and anxiety. Regardless of the particular delinquent act they engage in, these young people are effectively sabotaging the image that the parents want to maintain in the community.

And then, lastly, there are those adolescents who because of their needs to be accepted and loved by the parents — and these, you see much less often — are the kids who submit to the exploitation because their own emotional needs are so very great.

Well, let me say that delinquency is often regarded as an anti-social act. I don't believe that is true, at least for middle class delinquent kids. I don't think these kids are anti-social at all. They have incorporated middle class and peer group values. They know very well what they are doing. Their delinquency is a sort of anti-familial act. For the exploitation takes place in the home behind closed doors and drawn drapes. Nobody knows what is going on. And while these young people may not be conscious of the fact, I have the feeling that they are really asking for help. Workers have unions but there are no unions for children. In a sense, only their actions speak for them. They want people to see what is going on, to see what is happening, to take some action, to help or free them.

Middle-class delinquency, then, is not really anti-social. From an adolescent's viewpoint it may be the most adaptive thing he can do. Unfortunately, it is self-destructive. From his point of view though, delinquent behavior may be the most meaningful thing he can do to bring some kind of attention to the situation.

Now, the unfortunate part is when you get the parents in, there is little one can do with them. The difficulty is that the pathology is in the parents, while the symptoms are in the kids. The parent says, "Well, look, you know this boy is in trouble, why do you want to see me?" And it is very hard to get the parents to realize that they have any responsibility in the matter. Obviously, there is some awareness by some parents of their role in their child's difficulties, but it is very hard for the majority of them to see this when the symptoms are quite clearly in the young people.

To illustrate, I saw a case last week in which a 14-year-old boy broke into a house and had a woman undress at knife point. When I talked to the parents they said everything was fine at home. When I pressed them, however, the inevitable skeleton tumbled out of the closet. The father and mother hadn't been sleeping together. The father had been taking out second and third and fourth mortgages on his house and spending all the money, and was having an affair with a neighbor several houses away. Yet, the parents denied, trying to maintain a certain image, that anything was unusual at home or that anything in their behavior had anything to do with the boy's problem. This was particularly true of the father, who saw no relation between his behavior and that of his son.

And it is very hard, at least with the facilities we have available at this point to really help these kids other than sometimes to take them out of the home temporarily or to teach them better ways to deal with the exploitation. You can do that. But until we get some facilities for these kids — foster homes are often worse than the real homes, and the juvenile hall isn't any better since all they learn in such places is what they didn't know before in terms of delinquency — often what happens is they get stuck with the delinquent label. And, as the girl said, once you have the name, you play the role.

The eagerness of newspapers to put these kids' names in print and to brand them as delinquent is, I think, unfortunate because these young people are very easily pushed towards thinking of themselves as delinquents and towards perpetuating this self-image. But therapeutically, it is a difficult kind of situation because of this split between the pathology residing in the parents and the symptomatology manifesting itself in children.

Finally, I should say that I don't see parental exploitation as a total explanation of middle class delinquency. Clinically, I am sure you could find ego and superego lacunae, as well as personality and character distortions. Obviously, a complete account of delinquent behavior would have to take these dynamic and structural factors into account. All I am saying is that sometimes, by focusing upon the individual dynamics and looking only at the individual case, we may lose the more general factors that are involved: The concept of parental exploitation is one such general concept that seems to me to be useful in viewing middle class delinquency as a whole.

And my guess is that one might perhaps look at all delinquency, in part at least, as a product of exploitation, and that society as well as parents can engage in the exploitation of youth.

GEORGE SPIVACK, PH.D.

It has been said of impulsive people that they do not think of consequences, that in wanting to get from A to C, they forget about B. We have attempted to measure this dimension of behavior in a group of impulsive teenagers, middle and upper middle class delinquents and pre-delinquents whom I will call poor self-regulators. But this is a conclusion from the research rather than an initial concept. We reasoned that in any state of arousal of motivation the impulsive should more quickly conceive of or think about consummation or the end product than about the means to get to the goal or about the possible obstacles along the way.

Our study examined with many hours of interview and test procedures a group of about thirty "impulsive" youngsters in residential treatment; we compared them with a group of normal teenagers in public schools, who were reasonably matched with respect to race and socioeconomic status.

We constructed stories wherein we posed situations which we had reason to believe would create an aroused state, at least intellectually. We left the story incomplete at this point of arousal, and gave the subjects the ending, the consummation.

As an example, we told of a man in a concentration camp during the war, who saw his wife and children viciously abused by enemy troopers. He swore revenge. After the war, this man entered a little cafe and saw sitting at a table one of the ex-enemy. At this point we said to the subject, "At the end of the story the man kills this other man, avenging his family. You tell what happened. Fill in the details." The youngsters then told or wrote their own stories, connecting the beginning and ending that we had supplied them.

Our first finding was than the stories of the delinquent children are always shorter, whether they tell them or write them.

Second, even with correction for the shorter length of their stories, the delinquent youngsters insert material regarding means and ends significantly less often than the control group.

A typical story of an impulsive youngster might be, "And he saw him and his blood boiled and raged. And he ran in and grabbed a knife and plunged it into his heart." The feeling and act are the foci.

Other stories might have a degree of normal control: "He went in, but didn't want to be recognized right away." We score that as recognition of an obstacle.

"He might be recognized. He sits down next to the man with his back turned. At one point, he turned and was going to do something, but he saw a policeman out there," Another obstacle.

Or even lengthy stories of great plans: "And they met a friend and they planned to get him to the apartment and burn him," and so on.

In this artificial situation, then, the impulsive youngsters do not display a means-to-ends kind of planning which takes account of obstacles to be met along the way.

With a second group of stories we were interested in conscience. We did not, as has usually been done, bring the youngsters to the point in a story where a transgression has occurred, in order to see what follows after in the way of behavior implying guilt. We preferred to study any self-inhibitory function acting *before* misbehavior. Accordingly, our stories brought people up to the point of *possibility* of transgression, and we let the youngsters carry on the story from there, to learn what they fantasied might happen and what thoughts they had beforehand and afterwards.

For example: A boy is left home on the weekend. His father had gotten him a shotgun and shells for hunting. They live in the country and he loves hunting. But there is a rule in the house: no hunting without an adult. The parents were away, having reiterated the rule. The boy looks out of the window and sees a deer leap over the fence. He is really tempted to go out there. "Just finish the story!"

The impulsive and normal youngsters showed no group difference in the number of actual transgressions in the stories, but there were other differences. One was that the impulsive adolescents did not enumerate alternatives such as, "I want to go, but if I do go they might find out. But on the other hand, how would they find out? They aren't home," and so on. This kind of intellectual weighing of consequences and alternatives occurred much less frequently in the stories of impulsive teenagers.

There were differences also in the consequences of having transgressed or not. For the person who chose to ignore the rule and was caught, both groups had some kind of punishing consequences, and with equal frequency. On the other hand, if the transgressor was *not* caught, there was much less frequently in the impulsive youngster's stories any dire consequences or any implications that there would be punishment. And in the stories wherein they did not transgress, the impulsive adolescents did not reward themselves in the story for their good behavior, say, with praise of some sort. These youngsters had not, as it were, internalized either the idea of guilt, in the sense of self-punishment, nor systems for self-reward! They do not show anticipation that if you do good, "good" will follow.

We were also interested in the way these youngsters conceived of the past and the future. We asked questions about their past, very literally. We went back into geneology and asked what they knew of their great grandmothers or great grandfathers, their grandparents, where they came from on their mother's side, on their father's side, and so on. We assumed that if one feels related to the past, one is going to have information concerning it.

The impulsive adolescents had a smaller store of information about the past. When asked to give the names of persons who had really influenced them or had an impact on their lives, they reported much less frequently than control youngsters the names of anyone who had had an influence upon them.

With respect to how adolescents project themselves into the future, we surmised that the temporal life space, insofar as it extends into the future, may be reflected in any response which indicates the extent to which a person will commit himself to a distant future.

We created some hypothetical possibilities. For instance: "When do you think a man will run a three-minute mile?" "When do you think man will land on Mars?" "When do you think we will have a cure for cancer?" and so on. No one could say that these are impossible, but they did not (at that time!) seem imminent. The dates given in response by the impulsive youngsters were consistently and significantly closer in time to "now" than the dates given by normal youngsters.

We found this difference in future-orientation to be related to an actual living situation. In a residential treatment center a youngster had stolen a gun. The authorities couldn't find who had done so, so the entire group presumably containing the guilty boy was quarantined for a week.

Now these youngsters lived from week to week with a citizenship rating, which determined how much freedom they were going to get on weekends. If they behaved well and got an A rating, they were allowed into an adjoining town alone for Saturday afternoon. With a B rating, they went to town with an adult or a group, and so on.

Moreover, they could amass good grades. With two weekly A's in a row, they could go to a more distant town alone on Saturday; with four in a row they could go to Philadelphia for a whole day and have a "fling".

The quarantined group knew, however, that no matter what their citizenship ratings as individuals might be, no matter how they conformed *that* week, they could not get out. They lost this *immediate* incentive for good behavior. They still had a distant incentive, however, because even if good behavior this week could not pay off on Saturday, if they had had A's before and kept them going, the following Saturday they would be able to travel far.

This situation let us explore how far into the future the boys would think in terms of the consequences of behavior now. We postulated that future-oriented youngsters would still behave reasonably well because it would pay off ultimately. Those less future-oriented might have rather precipitous drops in behavior rating. We found, as expected, that the grades of those youngsters who had a more future-oriented time conception did not suffer as much as those of the more impulsive group.

How should we deal with youngsters with this kind of cognitive deficiency (or deficiencies)?

Of particular interest is modeling behavior. The people working with these youngsters to whom they relate well and for whom they begin to control their behavior are generally those who the youngsters feel really care about them. These are the people who stick with the kids through thick and thin, chase after them, give them hell in a crisis, and then protect them and pick them up when they need it.

Those people work best with these youngsters who, when the youngsters come to them for help, respond actively in the context of helping to solve problems. When the youngsters feel they can trust someone, they may come and say, "I have a problem. What do you think I ought to do?" At this crucial point one possible response is, "Well, what do you think?" These youngsters do not want that. They want something like, "Well, I don't know. If it was this, I would tend to do that." Or, "I had an experience like that once, and I did this and it had that consequence," and so forth. These youngsters want models, people who are going to think and to talk and to *display* the behavior that the youngsters themselves are deficient in. When I have asked the kids whom they admire and why, they almost invariably mention such traits as: "self-control", "can really think things out", "doesn't jump the gun", "he thinks it out first", and so on.

One youngster said it beautifully, "I like Mr. Green."

"Why do you like Mr. Green?"

"Well, he's a guy who has really been around and knows the world, and he doesn't get caught up in silly spurts of behavior. He plans things out. He is a real shrewdy."

I said, "Yes, that sounds interesting."

He continued, "You know, sometimes I think when I'm in a tough spot, I say, 'What would Mr. Green do?' "

This was a wonderful example of modeling behavior. A very literal identification process. This boy had the image of a real person in mind, and what he thinks this person is going to do he will himself do.

WALTER EMMERICH, PH.D.

Elizabeth Douvan's stimulating account of adolescence raises the curious paradox of adolescent tranquility in the midst of conflicting internal and external forces. While theory has led us to assume that adolescence is a particularly vulnerable period, her review suggests that this is not the case. Of course, when measured against what the adolescent *might* become, Douvan finds that the adolescent's ideals, attitudes, and behavior often fall short of their full potential, resulting in a "limited" identity.

In responding to this portrayal, one might ask whether techniques used to assess conscious attitudes really penetrate to the underlying concerns of people this age. Moreover, the recent dramatic increase in youth's concern with social values and participation in political events suggests that the rather serene picture of just a few years ago may have changed. Nevertheless, I suspect that Elizabeth Douvan's findings still hold, and that we do need to re-examine our theories. However, I question her rather gloomy interpretation that the adolescent's solution often is one of retreat and ego construction.

It is clear that adolescence cannot be understood without reference to the rapid biological and social changes that occur during this period. The traditional view makes much of these changes, and Douvan is probably correct in denying their overwhelming significance. But perhaps this period is characterized by much more than the emergence of disruptive forces and counteracting defenses. Is it not also likely that the adolescent has psychological resources available which integrate otherwise disruptive influences into constructive synthesis? We should not lose sight of the fact that by the time the typical individual reaches this period he already has a well-crystallized personality that serves to stabilize the impact of subsequent developmental changes. Recent longitudinal studies, notably those at Fels and the University of California, have shown how individual differences in personality are formed during early and middle childhood and lead the individual to be selective rather than merely reactive in his response to changing impulses and experiences during adolescence. Moreover, there is also evidence that the adolescent period ushers in a new series of ego capacities. Piaget's studies of formal operations, Douvan and Adelson's notion of future orientations as organizers of present action, and Kohlberg's data showing an increasingly complex and humanistic ethic during this period all point to significant growth in the ego resources available to the typical adolescent in coping with his world. Interestingly, it is precisely the *lack* of such ego resources that George Spivack identifies as the basic deficit of the group he studied.

This approach to the problem opens up a number of questions for research, only some of which can be touched upon here.

Consider, for example, the important problem of sex-role identification. There is evidence that individual differences in masculinity-femininity are formed during middle childhood and are reasonably stable throughout adolescence and beyond. But it is also obvious that the nature of sex roles change with development. Thus, for example, while the boy in middle childhood might stereotype masculinity in terms of aggressiveness, the late adolescent probably perceives the problem of masculinity in terms of occupational choice. By what process is the core masculinity maintained while the individual inhibits earlier phenotypic traits and acquires others? Perhaps this kind of shift can occur only when the boy is able to relate his own behavior to a revised and more mature understanding of what it means to be a man. Cognitive growth during adolescence probably induces such changes in the categories used in the identification process.

Another example is found in the study of the self concept by Rosenberg. Rosenberg notes that there are several ways of looking at the self concept, only some of which may be salient for the individual at a particular time. For example, it may not be the overall self-image or its discrepancy from an ideal that serves as a crucial organizer of the individual's experience, but rather that segment which the individual commits himself to, or "stakes himself as being". This notion of selective commitment raises an important developmental question. At what age does the child begin to differentiate between those many things it would be desirable to become and those fewer things it would be desirable, possible, and important to become? When does the notion of "being" something or someone become transformed into the notion of "becoming" in the sense that a whole series of instrumental activities becomes part and parcel of a commitment? Such changes would seem to have far-reaching implications for adolescent behavior, and probably depend upon the development of certain ego and cognitive capacities about which relatively little is known.

In sum, the emergence of integrating processes leading to reconstructions of social reality and one's place in it may attenuate the impact of external and internal forces during adolescence and reduce the necessity for ego restrictions that limit identity formation. Of course, the validity of this more optimistic view remains an open question that only future research can answer.

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ROBERT S. MORISON, M.D.

Last year some people out on the West Coast asked me to do a little paper on what the continuing progress of science, especially the biological sciences, was likely to do in the way of changing some aspects of our social problems and our social organizations, or more briefly stated, "the long-term social implications of progress in biological science."

Some of the remarks were published, and it is the only time in my life I ever had a lot of fan mail. It came equally from people who thought what I wrote was just great and from those who thought I was a dirty, subversive communist who never should have been invited to Los Angeles.

Between what I had in mind then and what we have heard in the previous technical and informed discussion here, the one point of contact seems to be with what David Elkind said at the very beginning: that parents have needs and that they use various methods to satisfy their needs. And some of these methods have bad effects on children.

In the 20th century, the status of parents has changed very markedly, and in large part because of the progress of the sciences — of basic physical science and applied technology, and of the biological sciences. The changes in the way we regard ourselves and in certain biological imperatives have affected parents in some specific ways.

In the first place, the role of the parent in transfering to the child simple technical knowledge about how to get on in life, how to support oneself, how to raise crops, how to keep the rain from coming in the windows, and so on, has changed enormously. One hundred years ago, a boy growing up on a farm could look to his father and mother for almost all the information he needed for operating the farm and for preparing and caring for food and for bringing up children. This is no longer true. If an eight or nine-year-old growing up on an apple farm is interested, let's say, in raising animals, his father may not be able to tell him much about raising cattle. He has to go down to the 4-H Club where there is an expert who takes over his technical training.

The same way with girls. My daughter was about 11 years old when she found there were better recipes for casseroles in the New York Times than any her mother could give her, and she began to look outside the family for technical knowledge.

In former times, the function of reproduction, of course, gave great status to the family and to the parents. It was very important in almost all societies up to about 100 years ago to have as many children as possible, partly to maintain the family, partly to maintain the society. And there was a coincidence of interest between society in this matter and the feelings of the parents. This is no longer true. Parents still wish to have children, often as many as four or five children; but society is increasingly saying that this isn't a very good thing to do. Indeed, if such high levels of reproduction go on much longer, we will face disaster. As these facts become more and more clearly recognized, parents become more and more uncomfortable and ambivalent in respect to their most fundamental role.

The foregoing are but a few of the more important factors which lessen the prestige and undermine the self-confidence of parents as we used to know them. They have, therefore, needs to use their children in abnormal ways, as Elkind has pointed out.

Finally, the more information we get about the differences between the human animal and other animals, the more crucial seem the delayed adolescence of the human species and the high degree of plasticity of its nervous system. Most other species have inherited behavior patterns of various sorts which are highly adaptive. Birds make nests to lay eggs in, and they exhibit specific inherited rituals of courtship. Man inherits only a tendency to be able to adapt to a variety of conditions. He is specialized in unspecialized behavior. This means that he is exposed for a very much longer time to environmental influences as he is growing up. Environmental influences become almost controlling in what kind of a person or what kind of an adaptive animal he is going to be.

The more we learn about this, the more we find that it is particularly important what happens to us very early in life. Indeed it is so important that we have now made the social decision that what happens to children during the first six or seven years of their life can no longer be left to parents alone. We are, therefore, creating a variety of social mechanisms to make up for the deficits of parents, in order not to have a completely fixed social structure.

The family can be thought of in a way as a great invention for keeping social stratification constant. Unless society realizes this and helps compensate for the rather fixed nature of parents, we will have a fixed society. So we have invented a number of ways in which society invades the home at fairly early stages of life. (It was this kind of statement that made some people so mad on the West Coast.) As Kingsley Davis says, the needs of society can no longer be thought of as coordinate with the needs of the family, nor can we regard society as just an enlarged family, with the expectation that as long as the family works according to old rules, society will come out all right.

What is the solution for the parent whose emotional satisfactions in at least the above three areas, and probably in others, are no longer as immediate or certain as they used to be?

I can suggest only that parents must learn to associate themselves and identify in a really gut way with the needs of society. They must feel that they are doing a good thing by having fewer children, just as they used to feel they were doing a good thing if they had lots of children. Experience teaches us that these changes will be terribly hard to achieve, because most of our ethics are built around a feeling about individuals. We are all moved by seeing a single starving child; but very few of us, I regret to say, are very much moved when we find that the infant mortality rate in the United States is staying at a relatively high level, whereas the rate in other civilized countries is continuing to decline. Even though it means the needless death of thousands and hundreds of thousands of children, Americans don't feel nearly as shamed by this as by the fact that one of their own children didn't get enough orange juice.

I am not enough of a social planner to be able to say just how we can bring ourselves to identify with the needs of society as strongly as we have identified with our past roles as parents, but I think we are going to be unhappy and our children even more unhappy unless we can figure out how to do it.

The adolescent seems to have done this to a degree. He can identify with his peer group and with social needs. Maybe this is the way he cures himself, if it is really true that he does.

MILTON J. E. SENN, M.D.

I will take as my assignment the *naming of issues* — issues in our society which concern me and which have relevance to my profession. I speak as a medical educator, as an administrator supporting others in their research, and as a clinical practitioner working with children and parents in ghettos, both in the Head Start Program and in that new venture called Follow Through.

As this symposium has proceeded, many speakers have dealt primarily with theories of child development and have presented results of laboratory research, skillfully performed. It has also been apparent to me that the researchers have in the discussion sometimes referred to practical applications of their investigations. While they have placed primary importance on their research, they seemed to welcome the chance to talk about how their studies might deal practically with the issues and concerns of modern man. Too frequently, however, the relevance of their studies has not been clarified enough nor given sufficient emphasis.

Let me take the presentation of Jerome Bruner as an example, possible unfairly in view of his absence now. I saw his brilliance of mind and his ability to design experiments and to articulate theories, and in a way I was excited with his studies dealing with the evolution of prehension and its relationship to learning. Evidently, he plans to carry forward this research for many years. But as I listened, I became saddened with the thought that in this day there are thousands of people who have developed prehensive ability to the utmost, who are physically able to use their hands well whether they are right-handed or left-handed, who nonetheless do not have the opportunity to use these skills because of social and economic handicaps and impediments. Too many of our citizens today do not have the opportunity to use the "tools" which they are anatomically and physically competent to use. We should not have to wait for years of study of prehension in order to learn how to provide people with jobs. The issue is not whether or not what we know about prehension is adequate, but why so many persons do not have the opportunity to use their prehensive ability in gainful employment.

In order to consider other issues facing all of us today, I would like to mention several assumptions which need to be challenged because while they are legally and morally sanctioned and politically espoused, they too often have deleterious effects on developing children. My concern is with developing children even more than with research on child development.

This does not mean that I am anti-research, that I do not believe in theoretical formulations, nor that I am impatient with research which is not readily applied. But I do believe that there are many things we can do to improve the lot of the developing child and mature adult, if we use what we already know and apply ourselves diligently and humanely.

The assumptions which I will raise as issues may or may not be valid but they should be tested. My hope is that those which are incorrect will be proved so. Probably the social scientist more than anyone else is the one to design the appropriate experiments for this assignment.

The first assumption that I would present has to do with what Robert Morison has just said. Parents today no longer have the opportunity to serve as they once did; they are in need of getting help in making new identifications, in getting involved in new endeavors where they may put interest and energy and thereby be more effective parents. It may be that the middle class nuclear family as we have known it is no longer the best model for child rearing. Would it be more realistic and more beneficial, not only to parents but to children alike, if children were reared in organizations where parents could more readily identify with communal efforts and endeavors and still remain parents to their children?

I am thinking of a model such as that of the Israeli kibbutz which has both been credited and discredited as a substitute for nuclear family child rearing. Another model might be those communal organizations in Russia such as the crèches, nurseries and pre-kindergarten schools. Social scientists such as Bronfenbrenner could tell us whether these organizations are as good as we are told they are. We should learn more about their advantages, and possibly take heed and guidance from them in shaping American family life in the future.

In a conference last week of the National Institute of Child Health and Human Development, the Dean of a Jewish theological seminary expressed his great concern with the fact that the majority of parishioners who come to him do so because their marriage is breaking up. It may be that this Dean and such clinicians as Albert Solnit and I, who also see such families, get the mistaken impression that most families are breaking up and that divorce is almost inevitable today. I wonder whether some of the tendency to divorce might be prevented if the model of our family changed.

The next assumptions that I would ask you to review with me also have to do with marriage and divorce. One is this: it is still commonly believed that divorce is more traumatic to a child than is existence in a family where parents reside in a state of chronic disharmony. Many people, particularly theologians, view divorce as always harmful to children. Under what circumstances is a divorce beneficial to a child?

In a divorce settlement, custody of the child is frequently awarded to the biologic mother. It is assumed that this will naturally insure him greater benefits than if custody is awarded to the father or to any person, even when there is evidence of character deficiency in the mother. Is this assumption true?

Another assumption commonly held is that children reared in day care centers or organizations such as Head Start Programs relieve mothers of responsibility in child care and this encourages them to spend more time away from their family. The 1950 and 1960 White House Conferences on children and youth, among other resolutions, recommended the establishment of day care centers for working mothers because they proved beneficial as well as necessary as family-care substitutes. It was advocated that such centers can be developed wherever possible and rapidly. This did not come about. The Head Start Program was a small beginning. But even as we sit here, there is a crisis in Washington today dealing with refunding of Head Start Programs, with strong pressure being applied to Congress to reduce such expenditures because "they cannot be afforded economically". Is this assumption valid? Is it true that our country which is called the richest in the world cannot afford programs for children which provide medical and educational opportunities, especially to those economically deprived children who are so numerous in rural and urban centers alike?

The next assumption has to do with welfare services and welfare payments. Politicians and many citizens who are concerned about the rising costs of welfare services assume that an important reason for this increase stems from the fact that so many people do not care to work, are lazy and prefer the welfare state. In order to discourage such attitudes, it is recommended that welfare payments be kept small and inadequate. The assumption that these politicians consider valid is that unless they have built-in provisions for causing inconveniences or suffering, welfare payments foster delinquency and irresponsibility in clients, whereas inadequate welfare allowances encourage sobriety, decrease illegitimacy and foster independence and initiative.

Another assumption related to clients on welfare is that such adults beget children who will be on welfare, thus propagating the dependency state from one generation to another. How valid is this assumption?

Proceeding to the area called the sexual revolution, an assumption is widely held by many young people and even their mentors in colleges and universities that pre-marital sex experimentation between two persons enhances their sexual compatibility in marriage and strengthens family relationships later on. Is this valid? Issues of sex are among the most disturbing facing our young people today and many assumptions dealing with sex behavior need to be evaluated.

Related to sexual problems are those of delinquency, and about this we hear many assumptions: for example, that permissive child-rearing practices encourage adolescent rebellion, foster irresponsibility, weakness of character and weakness of will. To many people, the ills of the world today are simply products of permissive child care or what is commonly associated with this, progressive education. Another commonly held belief is that a strict, highly disciplined punitive environment such as a military school or Army career is generally therapeutic for the acting out, impulsive, uncontrolled adolescent; force demands counterforce in the control of aggression. Or putting this assumption another way, compassion reinforces delinquent behavior.

It is also assumed without validation that parents who read about child development and psychiatry become anxious and that this fosters anxiety in parent-child relationships. The person who rears and educates children, whether this be a parent, a teacher or a physician is being assured that his techniques and methods of child care and rearing are beneficial "as long as he has confidence in himself", and has the proper attitude towards children; that persons who trust themselves, who love children and don't worry may be sure that everything is going to come out all right. This assumption negates the use of knowledge we have about child development. In this symposium it has been said that we have little knowledge about child development, and that we need more research before we can care for and rear our children optimally. It is my impression that we already know very much, that we have volumes recorded about child development research, and that while we have much yet to learn, the deficiency of our knowledge is not as great as frequently is assumed. Dr. Kagan in this conference has made a strong plea for the education of mothers in the ways of stimulating their infants; such early stimulation he believes may foster more efficient later learning. On the other hand, Orville Brim of the Russell Sage Foundation has written a critique of parent education, found much unclarity as to the results, and has raised questions about the efficiency of the methods of such education. He showed that historically most women for the past 50 to 75 years got more guidance about child care and child rearing from reading women's magazines than from professional educators. One of the issues, then, facing us is whether we should educate parents in child rearing, and if so what methods should be used, and what kind of persons should have responsibility for such teaching.

At this point I would make the practical suggestion to the National Institute of Child Health and Human Development that they have on its staff an archivist and historian, not to bury research publications or to see that they are filed away comfortably in some library, but to remind us all about research done many years ago, and to periodically bring it to the attention of members of the staff of the Institute and to others in various fields relating to child care. I am not thinking of the establishment of a clearing house of publications such as the Children's Bureau has developed so admirably. But it does seem to me that we are losing very much now in the way of benefit from research if we do not have librarians to help us rediscover the past, as well as historians to assist us in recording what is going on now in child development and child rearing research, and what is going on now in terms of developing children and families in our country. Only in this way will we gain some perspective about current happenings. Historians will find that observations reported concomitantly are more valid, more accurate and more meaningful than source materials which are impressionistic or reconstructed.

In our concern for the rising rate of delinquency, we frequently point with pride to the high rate of attendance at church schools and churches in our country. It is assumed that regularity of attendance enhances moral and ethical judgment and prevents delinquency, or as the Madison Avenue advertising agency says, "Parents who pray together stay together." Is this assumption valid? The issues of moral and ethical development of children are so crucial that the National Institute of

Child Health and Human Development is fostering a conference dealing with this subject. It may well be that issues dealing with moral and ethical behavior are the first in importance for all of us in our society today.

Many assumptions are made these days about planned parenthood and population control. One of our colleagues in this conference, Richard Day, who has been interested in population control and family planning recently put out a questionnaire to a selected group of pediatricians. Among other questions we were asked, "How many children is the appropriate number for each family?" I could not answer this question because I felt it was too subjective, too much a matter of individual regard. Yet the President of an organization dealing with population control recently quoted a study of Day's and gave 3.2 as the ideal number of children each family should have. The assumption that I would like to put before you then for validation is this: principles of family planning as to the number of children and the spacing of them in a specific family are based on scientific studies.

The last assumption I mention with some hesitancy because I may be misunderstood. But as a practitioner and as a clinician, I must say it. It is the assumption that clinical evidence about people and their behavior, however carefully observed, repeated and accurately recorded, is not as valid as evidence collected by laboratory research and hence is not as acceptable. Because of this assumption, there is a time lag before important public services are provided to children. I maintain that we should not have to wait for the results of experiments dealing with crowding of mice and rats in colonies to awaken us to the realization of the deleterious effects on human beings of crowding in cities. I submit that we shouldn't have to wait for laboratory validation of the evidence that Anna Freud and her colleagues gave us from clinical experiences with children in wartime England before we accept the fact that physical separation of children from family and home causes serious psychological trauma which is often irrevocable. We should not have to wait for laboratory studies to prove that hospitalization is injurious to children psychologically as long as astute physicians and nurses attest to this with their clinical observations each day they work in hospitals.

So I make a plea that the research of the honest clinical investigator be given serious attention despite the fact that his evidence comes from "the natural experiment". I believe that data derived from the contrived experiment, especially with animals, provide too often information which is not applicable to human behavior.

I plead that the clinician be given financial support and encouragement, and that more credence be afforded his research observations. Laboratory and carefully controlled experiments may well come after clinical studies to clarify and elucidate issues, but public services to children should not have to wait for that kind of confirmatory evidence.

DISCUSSION

SOLNIT: I want to comment on several aspects of the discussion, especially on Elizabeth Douvan's paper. I believe it has relevance for some of the other issues that have been raised.

I don't know what the data were that Elizabeth Douvan used, how she gathered them, or how they were interpreted. But to some extent, I had the feeling that we were living in different worlds. Perhaps that is the difference between living in a clinical world and living in a world in which research need not be tied into services or into clinical responsibilities.

It seems to me that the issue for adolescence is that of reactions to dramatic biological and emotional changes and their gradual stabilization over a period of time. And as a biologist, it would seem to me unthinkable that when the system has that kind of change in it, things can be so quiet and pleasant and sort of unresponsive.

Now, Douvan is perhaps reacting against an extremism inherent in our research and in our clinical formulations, the tendency to overemphasize in order to make a point, the tendency to eliminate and magnify one set of links and reactions in order to see its part more clearly, with the risk of overlooking the other factors involved.

We have learned to become concerned clinically when an individual teenager actually appears with the characteristics that were highlighted by Douvan's paper. A child who is somewhat pleasant and conformist, who dosen't seem to be giving much trouble and perhaps belongs to a group that is quiet and doesn't have much assertiveness in it occasionally suggests to us the question: Is his development deviantly constricted? Very often we turn out to be wrong in our concern because what is observable on the surface may certainly not be matched by what is happening inside — the turbulence of feelings, the sensitive responses, the fantasies, the anxieties, the aspirations, the poetry, the hypochondrial concerns — which may be very well kept from the interviewer who is viewed as someone to keep off your back. The adolescent may not feel able to share his inner self for many reasons, including the fear that he will lose part of his control if he begins to respond verbally to an interviewer.

In other words, I don't think that we always can judge from the surface. Of course, the privacy of the inner feelings and thoughts is to be respected. Some of these youngsters, however, do tend to have a somewhat constricted development. And we have learned to be concerned about that, because they seem to be opposed to exploration and experimentation, viewing it as either morally or socially unacceptable, not in a deliberate conscious way but as though their tolerances for intensity of feelings will be exceeded if they give up the posture that they have held onto from the pre-teen period.

This trend was implied by the vignette I presented yesterday of a pre-adolescent who was holding on fairly tightly to her own view of herself as though perhaps she could ward off the menstrual period and ward off the impending and threatening adolescent changes which she viewed as unacceptable for many reasons. Certainly, the socialization with peers often is utilized to achieve distance from the family and can be a vehicle for independent strivings and experimentation. In this socialization of peers the strength of the group is used to shore up the uncertainty of the individual adolescent who feels impelled and apprehensive as he explores himself and his world anew.

Cognitive capacities also unfold in adolescence, but if they are expected to replace those forces that serve biological and social demands, we often see clinical difficulties. You might put it into the metaphor that a powerful motor has been acquired but the energy of the motor is available before the regulatory and navigational instruments necessary for such a power launch have arrived. Before appropriate and adequate governors and navigational instruments can be developed and attached, the mariner must sail on alone with the compass that was adequate before he attached the more powerful motor. This dilemma is magnified because before the new, more powerful motor was acquired the mariner had been able to make good use of his parents as auxiliary navigational aids and controls. In adolescents, the feeling of danger in being too close to parents with the newly awakened feelings and the newly awakened capacities is another type of influence and force which helps them to try to maintain some distance.

Now, each mariner seeks out fellow mariners to sail with in a fleet, if you wish, to share the outcome of the calm and successful or troubled and stormy seas that they feel are ahead. And I think that one of the deficiencies that characterizes much of our research is the absence of the investigator from the field where the action is, with the teenagers. The research worker comes as an observer, but he cannot be accepted if he is neutral, so he must be available as an ally at times, trying to maintain both roles, that of the observer and that of the participant.

Those of you who have spent some time with older adolescents in Mississippi not so long ago, those of you who have visited Haight-Ashbury, those of you who have talked with VISTA workers, those of you who have joined some of the revolts of the older adolescents as observers and as allies, will know that the group does by alliances of one with the other not only achieve distance, but at times rebellious distances, against the family, but also by joining together, they tend to confront us, I would say, in an extraordinarily sensitive manner with the hypocrisy of our modern civilization. Some of these hypocrisies are very threatening now.

Instant destruction is something that an adolescent who is struggling with his own acutely awakened and enormously strengthened aggressive and sexual impulses has been able to treat as a fantasy. It may be quite difficult now to treat nuclear destruction and one's fantasy side by side. I suspect that a generation of adolescents are now confronting some of the difficulties that our modern technology has made possible as though the world were adolescent, too, without the regulative capacities proportionate to the energies it has unleashed with its new technologies, much as one sees in adolescence. One sees the risk in adolescence too often of trying to cope by separating deeply tapped impulsive energies and psychosocial reactions from cognitive aspirations and expressions, a desperate effort to control by division.

I cannot resist at this point pointing out that this is a risk that nonclinical investigators, clinicians and clinical investigators, should take knowingly — that is, the separation of understanding about cognitive and social-emotional development. And they should not only take it knowingly, but at the peril of setting our knowledge back when we try to study cognition without a sharp awareness of the larger, more complex developmental and ecological considerations of which cognitive functions are one important and critical part.

We must be aware also, I think, of individual differences. Negro youth doesn't want to be stereotyped; youth doesn't want to be stereotyped. The range of differences is very wide, indeed perhaps wider than the range in the younger groups or the later ages, owing to the extraordinary unfolding of biological, psychological and emotional capacities in adolescence.

KARST: Dr. Elkind, at the end of your talk, you seemed to throw in as an aside that the delinquent act in itself was a call for help. Do you really feel it helps? Does the notion add anything to the explanation?

ELKIND: I don't know if it adds anything to the explanation. The delinquent act is usually interpreted as anti-social; I am trying to indicate my impression that it doesn't have that connotation so much as an anti-familial action. I don't think these kids are opposed to middle class value systems, but that they are opposed to the exploitation that goes on in the homes.

KARST: Right. I prefer that explanation.

E. KUNO BELLER (MODERATOR): Actually, the delinquent act does usually end up in help—in some protective agency moving in. And if we assess behavior in terms of its consequences, which is a favorite clinical method, then one might well consider the delinquent act among other things a cry for help.

ALDRICH: I have two comments which probably could be added to Milton Senn's list of assumptions to be tested.

One of the most obvious assumptions we are all laboring under and which no one has verbalized yet is that learning is only for children. It seems to me that implied in previous remarks are the assumptions that investigators aren't aware of what we have learned about child development or that parents are seeking new opportunities for learning or relearning and things of this kind. And it seems to me that the clearest thrust of human development is that it must carry through the whole life span.

For example, I would like to suggest that we concern ourselves with how the learning process leads to the cognitive processes of older people and with the fantastic changes that take place at certain age hurdles. Some of these are statistical; some are just mysterious.

How do we deal with the learning process in the 45-year-old? At 60? What about the man who retires comfortably at 70, is then nearly bored to death until he starts up a new industry in which he becomes very successful, with retirement at 90? These problems are the essence of human development. They cannot be studied through examination only of infants and children and teenagers.

My other comment has to do with "mother power". It seems to me that we have invested a great deal of national effort in providing the new mathematics and the new physics, and we are getting much more sophisticated youngsters coming out of the high schools and into college. It bothers us professors to have to keep up with them. But in the areas that we have been discussing today — young persons' ideas about their biology, their ability to reproduce, their ability to join society and remake it with their own ideas — in these areas we have done almost nothing. We give little education about sex or about preparation for parenthood, whether in the nuclear type of family or another sort of organization. We have no new biology in the sense that it is focused on human problems and prepares young people not only for parenthood but for family life as it is going to be in the future.

DONALD H. FORD: Milton Senn's comments make me want to share some feelings about these meetings that I thought I was going to keep private. I think others have shared them.

I am not being critical of the contributions people have made: we have had the benefit of very able panelists. But I have found myself asking how is this meeting different in dealing with issues in human development from a meeting on the first day of the American Philosophical Society, followed by meetings of the Academy of Pediatrics, the American Psychological Association, and the American Orthopsychiatric Association or the American Psychiatric Association? What is there about this exercise that is different from those that already exist full-blown and are operative?

Perhaps a better analogy might be the meeting of the AAAS, where you get people from all kinds of disciplines talking to one another.

Well, it seems to me that the idea of human development is a different idea, which dosen't yet, however, appear to me to have come out. To me, it is an activist concept. Milton Senn said that, I think, with his assumptions. Humanness is more than a name for a species of animal. It is a quality of something.

Development carries for me the connotation both of direction and elaboration. Unless we think of it as being simply biologically programmed, there are lots of value judgments implicit in the idea of development. Human development connotes to me a positive thrust, not just running around putting out fires and solving the ills that people have, but creating conditions in which people can live significant lives.

It seems to me that we need to come to grips with the issue of what it is about a symposium on human development that differentiates it from a meeting of other societies. If there is no difference, we needn't try to generate something new.

There are some assumptions underneath all this that I think are terribly important and I will express them as a personal view. A first assumption is that one property of man is his capacity and desire to shape his environment to his own ends. This property of man is expressed in many ways, in technology, in engineering, and so on.

A second assumption, I think, is growing with force upon us. It is that perhaps we can shape *ourselves* (and our social environment) to our own ends. That, to me, says something very different about the concept of human development.

In discussing physical growth and development, we talk about changing the character of a person by the way we feed him or exercise him. Some biologists tell us before this century is out we will be able to change the character of a person by genetic engineering. These are powerful tools. Perhaps we can shape our own destinies in totally new ways. That seems to me to be the message of the last third of this century.

Not only do we need to talk about what we are, which is what most of our scientific disciplines do, but in this day and age we have to begin to worry about what we will become. We are shaping and reshaping ourselves, I think, by what we do to our physical environment and by the tools we are going to put into our hands to do something to ourselves with. We cannot any longer, moreover, pride ourselves as scientists upon not making value judgments.

I think we have to think of human development not as a new discipline, but as three thrusts. One we already have in our disciplines: a commitment to study various aspects of human function. A second thrust is a major commitment to be developed to put the pieces of man back together again and integrate knowledge across boundaries, so that we can understand the person in his social and physical environment. This is a kind of ecological thrust. The third thrust is to develop a style of research that translates its findings into immediate applicability to human problems, which I think reflects Dr. Senn's concerns.

Now, I think the kind of scholarship which takes things apart to see how they work is very important, but I have the feeling in my bones that it is different from the kind of scholarship that puts things back together again to make them useful. I feel that the person who does one is not the same person who does the other.

Some say we may not know enough to tackle these last two issues. I had it seriously proposed to me by a psychologist that psychology should stop spending money on applications in fields like clinical psychology and spend 15 years doing nothing but basic research, and that by that time we would know enough to do something. We will never know enough! But I think we know more than we think we do. We know enough now to take some action.

For example: poor people don't have any money; they are the last to be hired and the first to be fired; their family disorganization and disintegration are much worse than in other segments of our society; they get the worst health care. We know a lot of things about poor people. We don't know exactly what to do about their problems, but I think that if we brought together all the knowledge in our basic disciplines we could develop some strategies much more effective than the empirical strategies being currently manufactured in a kind of haphazard way.

What I am trying to say is that I don't think we have been talking about human development. We have illustrated the problem we have to solve if we are to talk about human development. That is: How do we cross our disciplinary boundaries and put man back together again, to create a world for ourselves?

PART VI THE CITY

Paper by

Robert B. Mitchell, Center for Urban Research & Experiment, University of Pennsylvania

Respondents

Sanford Kravitz, Ph.D., School of Social Welfare, State University of New York
Richard L. Day, M.D., Mt. Sinai School of Medicine

Robert Mitchell examines aspects of the city, as it both serves and fails as the arena in which human growth and development occur. Sanford Kravitz underlines the urgency of social planning aimed at coping with problems of the times, and Richard Day indicates that population pressures demand the highest priority for the mobilization of public opinion and energies.

IT DEPENDS ---

or

How Does the Physical City Affect People?

Robert B. Mitchell

I am grateful for the opportunity to take part in this meeting, which allows us to begin to cross disciplinary boundaries. I am reminded of a story that I believe is old enough so that most of you will not have heard it. Louis Wirth told it to me during the second World War.

It seems there was a peasant living in an area that might be Poland, might be Russia. He was very much concerned as to which it was going to be. Finally a surveying party came through, and ran a line; and he was right out there with them, watching every move they made.

And they said, "Why are you so concerned? Why are you so interested in what we are doing?"

"Well, I want to know whether I am going to live in Poland or in Russia."

"Why are you so concerned? Do you feel that if you live in Russia you will lose all of your private property and all of your personal rights and so on?"

He said, "No, no; I don't care about all those things, but I could never stand those awful Russian winters."

Yesterday, never having myself studied psychology and being, I suppose, one of David Elkind's impulsive types, I thought I would put on an astrakhan cap and mittens and enter the cold field of science as a tourist for just a minute this morning.

I decided to begin the day by asking two questions related to what we were talking about yesterday.

I was very much interested in Bernard Kaplan's concern for a definition of the difference between what we conceive to be development and what we conceive to be change, because this is inherent in the whole idea of the willful look at the future which we are trying to take in planning. If we are looking for an ideal model for development as distinct from change, and if we want a definition a little less rigid than the one of specialization and hierarchal organization, we could try this as a first question:

Is development, as it accompanies growth, increasing experience and maturation, (1) the continuing ability to adapt to the environment and to the increasingly more complex expectations and requirements made upon one by the environment, and (2) the ability to act upon the environment toward the satisfactions of one's values?

I throw this out as a possible other way of looking at what we might mean by human development.

And then, taking yesterday's morning and afternoon sessions together, as a rank amateur in this field, I really don't know where you conceive cognition ends and something else begins. My second question would be: As development and maturation occur, are there successively larger domains of cognition in about this kind of order:

First, to perceive an objective simply as an object with geometrical form and color, with no associations;

Second, to perceive an object as a representative of an essential phenomenon or function, the essence of the reality or the generality in back of this specific object;

Third, to perceive an object in its implication for one's life space;

And fourth, to sense the object in its implications to a larger system, intellectually perceived?

And I wonder, then, as we begin hanging on meanings, like colored balls on a Christmas tree, where do you conceive that cognition ends and something else that means a great deal to *me* begins? Here I refer to something I am going to come back to later, which has to do with the meaning of place to people.

Well, it is fun to be irresponsible in foreign intellectual territory.

Today, we make a great leap forward or backward, as you like, by changing our perspective in three ways:

First, from study within a discipline, with its necessary but often unreal abstractions to consideration of the whole real concrete situations in which the city planner works.

Second, we are jumping from issues of fact or method arising from research to issues of public policy where a value choice is implicitly or explicitly made.

And third, we are jumping from issues stated in sharp detail and with scientific precision, to large-scale societal issues of much greater generality, often involving perception of whole patterns rather than logical progressions of thought.

I have often thought that the city planner in his concern for human development (which in Kaplan's ideal sense is the planner's main justification for his work) needs an intermediate science such as that called for by Robert Aldrich in our opening session, which is cross- or multi-disciplinary and which is concerned with these larger scale societal issues.

In other words, we need more knowledge at this other scale because it is very difficult to translate from the individual little pieces such as we were hearing about yesterday to issues in development related to the total urban environment.

Now, I have an overriding consciousness that while we talk here with each other in academic fashion, our American society appears to be going in the direction of demoralization through erosion of our image of our country and of ourselves as Sir Galahad in bright and shining armor. We no longer have quiet confidence that we are always right and virtuous, — always, of course, in the right.

The fires of civil war between races are all but lighted. And I wouldn't be a bit surprised to see it breaking out all over the country. Stereotypes grow into distrust and distrust into blind hate. On the other hand, the blessed, idealistic youngsters are rejecting the ethics, the values and the institutions of the past which they consider antisocial, inequitable and immoral. And only out of this, I believe, maybe through fire, a better society with greater opportunity for human development may emerge.

Now, another thought before I finish this prologue. As I have listened to our discussions, I was reminded that for many years urban sociology was what the Chicago school learned about that city. Let's not be parochial, embedding in our thinking unrecognized and unspoken assumptions based upon the contemporary culture, manners and values of the United States.

Let's look at the work of the Commission On the Year 2000 which is represented in the Summer, 1967, issue of DAEDELUS. What kind of future do we see? What are the differences which are going to affect adaptation of past ways of living to that future? Let's look at other nations and other cultures than our own and get a chance to check whether we are making unspoken assumptions in our conclusions about these experiments. And then let's not confuse current behavior with what people really want to do.

The traffic engineer when he is making a transportation study takes a sample of a population of households, asking where everybody in each house went yesterday. And then, he aggregates this information into major patterns of movement among parts of an urban area for various purposes. He draws these on a map, and he calls these "desire lines". He assumes that this is where people really wanted to go and forgets that their behavior was actually very much constrained by opportunities and by a current real situation that may be very, very different from the anticipated future situation.

If they project this into the future, it presumes a continuity of human behavior that I think is a most unlikely thing.

So much for Prologue.

The question posed for this morning's meeting of the symposium on Issues in Human Development is this: What is the impact of the city or neighborhood as a physical entity upon growth and development? This paper would be richer if the writer had already participated in the earlier sessions of the symposium. Presumably they will have emphasized the processes of growth and development, and the immediate influences which affect development directly. I must start at the other end of the question, from the characteristics or aspects of the physical environment which, one would guess, are components of the vectors which make up the environmental influences.

Necessarily this paper will ask questions more than suggest answers. We don't know much; and where we have some knowledge the answers are ambiguous and evasive. It depends ---.

Let me state my first proposition, which has already been suggested: The physical city is only an aspect of a total environment. Of course, a few physical characteristics of the city act directly on the individual; rats bite babies. But many of the urban influences act through intervening variables of a social, economic or cultural nature. Come to think of it, my illustration above may not be too good. Rats bite mostly poor babies.

The city is a complex, whole situation, and the physical aspects of that situation act with differing effects upon an individual, depending upon the social, economic and cultural aspects of the situation in which the individual finds himself. This is trite, of course, but needs to be born in mind.

Another obvious *caveat* must be stated. As any physician knows, any effect of the environment on an individual is conditioned partly by the inner state of that individual. And the satisfaction of an individual with his environment depends partly upon his experiences and his expectations. Most Chinese in Hong Kong or Singapore live at densities which would be unthinkable to members of this symposium.

There is another reason why we don't find much hard data about the effect of the physical environment on individual development: most effects would be measurable only over considerable periods of time. Most individuals don't stay in one place, either socially or in space, long enough for changes to be measured. The population of most urban neighborhoods changes constantly. In some areas of poverty the entire student body of an elementary school may change within a year.

Actually the duration of an individual's relationship to a particular local environment seems to change his perception of that environment, and thus his reaction to it. Almost twenty years ago, in a study of residential mobility in Philadelphia, Peter Rossi found that up to a point the physical extent of one's concept of his "neighborhood" varied with length of residence there.[1]

Some scholars, including René Dubos, have pointed out that man "is the least specialized creature on earth. He is indeed the most adaptable."[2] Whether this is true genetically I do not know, but it certainly seems to be true of reactions to environmental stimuli. Witness those who learn to sleep in rooms adjacent to a railroad track. One aspect of this adaptability, of course, is man's ability to change or control his immediate, intimate environment, as, for example, by wearing long, red woolies or buying an air conditioner.

I would expect that there are three general ways of considering the physical environment as it may influence the lives of people. First are the mechanical, chemical and biological properties of the local part of the biosphere or technosphere, such as the quality of water supply or the noise of traffic. The second group are found in the functions of the natural and man-made environment as place and as space for living, working and playing. Consider the Piazza San Marco in Venice or the interior of a railroad flat in Manhattan. The third group of environmental characteristics are locational. They result from the arrangement in space of man's bases of operations — places where he lives, works, etc., as this arrangement affects his range of opportunities for interaction. The effects of this locational pattern or arrangement are moderated by our systems of transportation and communication which change the relationship between distance and accessibility.

Any single part of the environment should be considered in all three ways. A street may contain traffic which pollutes the atmosphere. Its design may be obsolete if it has inadequate capacity for the traffic which tries to use it or it mixes pedestrians and motor vehicles with resultant deaths and injuries. By its location it may form a barrier to interaction between two groups of people or may prevent the safe access of children to school.

Direct Biological or Sensual Effects

I remember the speculations of Ellsworth Huntingdon about the effects of climate on man and his society. Unfortunately I have not followed the scientific discussion of this question through subsequent rounds, so I leave further clarification to my scientific colleagues.

Man adapts to climate by altering his microclimate, as suggested previously, and by arranging his activities and relationships — as in the Mediterranean siesta. It has been suggested that this institution has its demographic effects. It has effects also on the distance relationship between a man's home and his place of work because he must make the journey four times each day. And in turn this changes traffic patterns and the economic viability of a transit system!

Usually man has adapted the design of his city to climatic imperatives. The ancient tropical or sub-tropical city had narrow streets for shade, and perhaps covered walkways around the central market place. Houses turned their backs on the street and opened to interior courts, often with fountains and gardens. The hot sidewalks (and subways) during a Philadelphia or New York summer are said to contribute to social tensions — certainly to discomfort and fatigue. If cities could be designed with principles derived from microclimatic study in mind, some of these effects could be moderated. Trees and greenery are said to absorb heat and reduce the multiplying effect of asphalt, concrete and masonry in pavements and walls. Also some designs can induce air currents.

One should not leave the subject of climate without an inquiry about the effects of large and frequent changes in temperature and humidity as we move between outdoors and air-conditioned, or centrally heated rooms. In what ways are such changes in temperature beneficial or harmful?

Too much housing in city slums still has leaky roofs, wet basements and winter draughts around doors and windows. To Americans lack of winter heat in such habitations is harmful to health. Our British cousins may not agree. Can science decide the issue?

We hear much, these days, about pollution of the environment — particularly air and water, but also accumulations of filth in apartments, hallways, streets and vacant lots.

Presumably the scientist can relate the chemical composition of the atmosphere to health; I have seen some evidence of disagreement recently in newspaper articles. Possibly we can be sure at this time only about the stronger and more dramatic effects of dense and prolonged smog. This may suggest that we should be more concerned with thresholds than with entire ranges of environmental impact.

One who has watched the sun-bronzed boys diving and splashing with glee and abandon in the Klongs of Bangkok may wonder about establishing the effects of water pollution on people. These muddy canals serve as sewers, highways, markets, swimming pools, bath tubs, laundry tubs and dishpans for those who live along them. Have we any records of the health effects of such practices, or of bathing in the Holy Ganges?

New York still dumps untreated sewage into its rivers, and closes a number of beaches because of pollution each summer. Chicago can have a lake front playground along her entire shoreline because of her sewage system. But let us look at Calcutta by quoting a 1966 planning report:[3]

> "Especially during periods of concentrated heavy rainfall — and over 80 per cent of Calcutta's annual average of 64 inches of rain falls during the three and one-half months of monsoon — the effects of inadequate drainage become visible and real. Streets are quickly flooded, and water stands knee-deep, paralyzing traffic and commerce, adding much to the miseries of life throughout the city, particularly in the mud huts of the bustees. The close relationship between drainage and public health becomes readily apparent as the frequent flooding increases disease and pollution through the spreading of faecal material in the roads and lanes and elsewhere when the city's combined drainage and sewerage system becomes overloaded."

Also:

> "Only 54 per cent of the Calcutta Corporation is sewered, Howrah (the large city across the river) has no sewerage system whatsoever, nor does any other municipality throughout the CMD — with (minor) exceptions . . . "

And again:

> "The vast majority of the people in the cities and towns of the CMD have to depend on the dry conservancy system of night soil disposal; that is, of periodic collection of night soil from service privies by Corporation or Municipal trailers . . . . A "service privy" can be described briefly as a small brick-built shed containing a platform above an earthenware bowl at ground-level which receives the droppings of human excreta. This bowl, usually fully exposed to flies and to human view and usually filled to overflowing with excreta, is emptied into the trailer by Corporation sweepers — inefficiently and irregularly in most cases — for transport to disposal pits on the edge of the city.
>
> "The service privies represent a constant health hazard. During the monsoon floods, their contents are carried freely throughout the bustees to infect and pollute the tanks in which people bathe and wash their clothes and utensils . . . It is not surprising that Calcutta has acquired an unenviable notoriety as a 'packed and pestilential town,' to use Kipling's phrase, and as 'the cholera capital of the world.' . . . Here . . . cholera is endemic throughout the year, with peaks from March to June . . . The insanitary condition of the CMD, which arises partly from the physical drawbacks of the site, encourages the spread of cholera and of all gastrointestinal diseases, and also of smallpox and tuberculosis . . . "

Water quality for domestic supply is assumed in the United States, although the desirable range of chemical composition is argued, as in the case of fluoridation. Sometimes it contains a quantity of political folklore in solution, as in the case of New York's insistence upon a supply of "mountain water".

Calcutta has an average daily per capita supply of 28 gallons of filtered water and 84 gallons of unfiltered water. The planning report says:

> "The unfiltered supply of 90 million gallons per day in the Calcutta Corporation area direct from the River Hooghly is intended, and is generally used, for non-drinking purposes such as street cleansing, fire fighting, toilet flushing and sewer maintenance. In actual practice, however, considerable use is also made of this water — particularly in bustees — for washing foodstuffs and utensils, and for drinking. An examination of this unfiltered supply in 1959-60 and later showed the presence of cholera vibrio in five per cent of the samples taken. At the urgent recommendation of CMPO and WHO officials, chlorination of the unfiltered supply was started by the corporation in 1963 as an interim measure for controlling the disease . . . "

A major problem in most large cities is the collection and disposal of waste. Although Calcutta's problem is overpowering, that of New York or Philadelphia is immense. Given adequate budgets, however, modern technology can do the job.

The dangers of pollution from atomic wastes are often cited, and will probably be recognized with more stringent public controls as industrial use of atomic power increases.

Although it may seem more repetition of the obvious, this catalog of direct effects of the physical environment would not be complete without mentioning injury or death inflicted by accident, negligence or "acts of God." It is well known that we kill about 50,000 per year in or by automobiles in the United States. A major effort of transportation research is to improve the design of highways for safety, and also to develop a method of high speed transportation by which individual vehicles will be controlled electronically, eliminating the so-called "human factor", which covers far more than excessive alcohol or bad judgment. The "reaction time" of many individuals is too slow for the combination of speed and distance between vehicles on modern highways.

Non-motor vehicle accidents kill somewhat more people in the United States yearly. Of these over 8,000 are from fire, of which some are caused by burning buildings, and over 5,000 by drowning.

Crime in the streets and parks of the cities, including assaults on persons, seems to be growing, to the extent that the individual is afraid to walk alone in many parts of our cities. In addition to police protection, better lighting and more thoughtful urban design may reduce opportunities for assault. Children growing up in areas of danger are affected in their basic interpersonal attitudes and relations and in their patterns of socialization. A variety of studies, such as *Street Corner Society* or novels such as *Last Exit to Brooklyn* have explored these issues. Some writers have suggested that a mixture of population and other activities, by which the streets are "busy", and thus self-policed, might reduce such crime.

Natural disasters, including earthquake and flood take their toll annually. Some cities are adopting zoning ordinances restricting the use of land in flood plains to recreation or other uses which will not endanger lives by this cause.

What is the tolerance range of sensual stimulation which people need or can take without harm or will seek for enjoyment? This I must leave to the psychologists. It has been claimed for many years that various colors stimulate different emotional responses. We know this is true of combinations of sounds of varying tone quality and rhythm which we call music. We don't like that "stockyards smell", remembered by old Chicagoans, but a recent magazine tells the confused businessman how to go about selecting for his wife one from the 500 distinct combinations of flower and animal essences and alcohol we call perfume.

I have read popular articles about the experiments intended to determine the reaction of subjects to *absence* of sensual stimulation. There must be a lower limit, which may vary among people of different age and temperament. Another writer claims that he can "take a trip" or experience heightened awareness without the help of drugs. We are amused by stories of the city people who can't sleep in the country for the stillness — or the sounds of birds and animals.

There must be a negative to positive scale to such human reactions. Attempts have been made to measure the effects of different intensities of sound; and noise control standards tend to be in terms of decibels. But this is only one of a complex of dimensions. The crashing crescendo of an orchestra serves as punctuation or emphasis in music. The same intensity continued over a long duration would be intolerable. Tone quality is important. A patterned arrangement of sounds may be pleasant if arranged under familiar principles, but unpleasant and irritating if the expected rhythms and harmonies are not there. Do some cacophonies produce or bring to the surface acute anxieties or other distress? What of city noise in general?

I suspect again, it depends---. Is the nature and quality of the sounds appropriate to the mood and occupation or repose of the hearer? What meaning does he draw out of his past experience? Is he hearing the sounds voluntarily or against his will? Is the time and place appropriate for serenity or excitement, contemplation or action?

We suppose that concurrent stimulation of the various senses has mutual effects. New art forms seem to combine light, color, form, motion, sound and even smell. And deprivation of one sense, such as sight, seems to bring heightened awareness of others.

If all of the sense stimulations are considered as messages in a flow of information, we hear about "overloads" of information breaking down the receiving and sorting capability of the subject. What if we get one kind of meaning through one sense and another meaning through another?

The city scene, I suppose, is a big "happening" from which we derive many meanings. How can we sort out the negative to positive effects on the human being? I choose to live on a quiet street.

Place and Space

If one can say of an urban space "there is no there, there" one means it doesn't have what some recent writers have called "placeness", of a recognizable identity which one can feel and to which one can relate. Thus we must consider space in the city in its subjective relation to man. But first, one should review the functions or uses of created space as it is intended to meet man's requirements.

Of the buildings man occupies, the one most likely to affect his growth and development is housing. People in the public health profession have been concerned about housing for many years, and still we don't have specific knowledge of the functional relation between the two. Knowledge of the effect on mental health is even more tenuous. In the syndrome of poverty, what part does poor housing play?

There have been a number of attempts to measure the influence on the social contacts of families of the spatial relationship of building entrances and dwelling units to each other. The first of these studies I remember was by Leon Festinger and Associates in Cambridge, Mass. I suspect, as mentioned later, that even such micro-accessibility has varying effect by socio-economic level.

In America we have set up a number of "obvious" housing standards. Housing should be structurally sound and weather tight. It should have central heating and a private bathroom for each family, not opening off the kitchen. It should have hot and cold running water in each apartment. Each room should have adequate natural light and ventilation. Windows should be screened against insects where necessary, and the rooms should be rat proof. Public halls should be well lighted, and an adequate waste removal service should be provided. Privacy should be possible in each bedroom; that is, a bedroom should not serve as a corridor to another room. We have standards for occupancy: no more than two persons, except infants, to a bedroom; and unmarried family members of the opposite sex above a certain age should not occupy the same bedroom.

These standards would seem unnecessarily luxurious to our ancestors, and to many people in other countries today. A Japanese student studying housing problems in our school remarked that Japanese families can live happily in fewer rooms than American families, because privacy within the family is not so highly regarded in Japan as in America.

I remember a slum in Sago Lane, in Singapore's Chinatown. We would call the buildings typical row houses with shops on the ground floor. They used to be occupied by Chinese merchants, whose families lived above their places of business. With prosperity the merchants' families have moved to the suburbs, American fashion, and the upper floors have been subdivided for poor families. The second floor of one building has been divided into five compartments, about ten feet square, with boards below and chicken wire to the ceiling. In each compartment live six people, from babies to grandmothers. A common kitchen with a shelf and six charcoal cooking pots is in the rear, with a primitive toilet having running water.

These people exist on practically no income and spend as little time as possible at home. Outside, there is a rich and variegated street life, with crowds of people, street stands where for pennies one may buy a meal or almost anything else, hawkers with their trays of trinkets. Down the street is a lodging house for single men. An elderly, bearded Chinese philosopher who might be pictured on an ancient scroll, sits at a table at the entrance. Each man has a shelf containing a pallet, Pullman fashion, enclosed in chicken wire.

I have no health statistics on Sago Lane, although Singapore as a whole has a very good health record. I sensed a strong feeling of community and friendliness — none of the alienation one finds in North Philadelphia. Is it because the Chinese are the ruling majority in Singapore, and these people are living in an ancient, traditional urban fashion? With no television sets on which to see the goodies of an affluent society advertised, are their expectations and life's fulfillment not too far apart?

The night scene in Sago Lane has the atmosphere of the midway of a state fair, without the side shows. An occasional automobile or pedicab crawls through the crowd of pedestrians. The street is mostly a place for the common life. Traffic moves somewhere else.

Here is a culture which values the common spaces over the private spaces. People share the common amenities in lack of private amenities. I believe that America's emphasis on the individual and our preference for a private amenity, such as a barbecue in the backyard, over a public amenity such as a cafe on the riverbank or on a boulevard, is symptomatic of a style of life which distinguishes us from most Europeans. I would ask you what social, or psychological, or child development significance this may have. Our whole physical environment is built around this set of values and way of life.

The park and recreation movement in the United States has provided standards for the amount of recreational acreage per thousand persons needed for various categories of outdoor recreation area in cities. These standards are readily available and seldom achieved. A newer refinement is to vary the standards by the density and socioeconomic level of the area's population. People with large backyards don't need or use as many playgrounds. The purposes of recreational areas, according to a recent study by the New York Department of City Planning, are divided into four categories: relaxation, physical fitness, socialization, or rather, socializing, and acculturation or informal education. Presumably availability of such facilities is an aid to growth and development. I would suggest that the exact correlation is unmeasurable.

Architects, painters, poets and novelists have told us more about man's reaction to the spaces within which he finds himself than have scientists. They have spoken of "the genius of the place" as a subtle impression created by the particular blend of natural site and man's construction. This influences man's mood, his style of life, his actions and reactions in ways which, I suspect, must be felt rather than understood.

The spaces and buildings of a city possess a symbolism which for ages has reminded man of the religious meanings in his life, of his values and of continuity of his place in the history of his people. It gives him an awareness of himself and of his social identity. Particular places or areas of a city acquire prestige to which status seekers among business firms and individuals are particularly sensitive; and the reverse is true. The slumness of many ghettos must play its part in dispiriting their inhabitants, in perpetuating the "culture of poverty", and in forming the stereotypes of prejudice held by the larger society.

I shall leave it to the psychologist or the anthropologist to discover and tell us about the mechanisms by which all this occurs. Let me quote a few writers:

> "I have a great admiration for Paris: it is forever new. I know that I must go through it as one goes through school. It is not until you have come to feel its size and boundlessness that it annihilates you. Then you are humbled and realize that you must begin any serious attempt at living all over again."
>
> Rainer Maria Rilke, 1907

"On the boulevards of Paris you find freedom of the mind. You find life, a strange fertile life, a communicative life, a warm life, the life of the lizard in the sun, the life of the artist, an amusing life: a life of contrasts. The boulevards are never twice the same. They experience all the moods of Paris. They have their hours of melancholy, their hours of gaiety, their empty hours, their tumultous hours, their hours of dignity and their hours of shame . . . "

Honoré de Balzac, in
LeDiable a Paris, c. 1845

"If ever I relish the penetrating sweetness of having been born in the city of generous thoughts, it is when I walk along the quais where, from the Bourbon Palace to Notre Dame, the stones relate one of the most beautiful of human adventures: the history of ancient and of modern France."

Anatole France, in
Pierre Nogiere, 1899

"In Paris certain streets are held as much in disrepute as a man guilty of the worst crimes. But there are also streets that are noble, streets that are respectable, new streets about which public morality has not yet formed an opinion; murderous streets as old as the oldest dowagers, estimable streets, streets that are invariably clean, streets that are always dirty, industrial and mercantile streets. In a word the streets of Paris have human qualities. They force upon us certain irresistible impressions against which we cannot defend ourselves."

Honoré de Balzac, 1831

" . . . what had struck me about Oreste's street vigils in the small hours was that, unlike a person who is waiting, he was not bored. He was watching. Something was happening, an invisible procession was filing past his rather prominent eyes . . . And I had noticed this same busy, active look . . . in all those I saw prowling, or loitering without apparent object. They could spend whole days of it, in gardens or roundabout the Pantheon, among ruins and fountains . . . They were looking at Rome . . . these innumerable patient stares had conjured up Rome's beauty. It was in response to their unspoken demand that Italy had become the country of the arts, where all is spectacle or promise of spectacle . . .

"That was why it was vain for my fellow countrymen to send town-planning delegations and study groups into Italy; they could not succeed in correcting the poignant ugliness of the setting they gave to their lives . . . incidently, an ugliness that disturbed very few of them. They had none of the Italian patience in merely looking, that insistence which provokes the miracle. They had no leisure for looking, they thought it more useful to be doing something.

"I also noticed in each of the cities I visited, certain specific notions of distance. A small town can be oppressive, seem more enormous than a great one, when the size, line, alternation of substance and void are clumsily managed. But sometimes this clumsiness is only apparent and hides a subtler design. Florence achieves a delightful advantage in the awkwardness she imposes on all her creations, scattering her treasures so that they fall askew. Thus a magnificent fountain will be set in a corner instead of in the center of a piazza, itself irregular; . . . and Michelangelo is stood in a corner like a naughty schoolboy. It takes some patience to feel asymmetry give rise to uneasiness, and that uneasiness to a most rare impression of harmony.

"In Venice, great masses are united in a bizarre design, within narrow spaces, while beside them are wildly prodigal, vaster, virgin spaces unrelated to what surrounds them . . . Venice's function is to induce in us the discovery of the real by way of illusion . . . "

> "But in Rome form and space are what they are. No mirage quivers about her stones, no street you tread is immeasurable. All is composed, arranged according to nature's honest law. Rome has never driven me to desperation as other cities sometimes have. Even when I have walked its streets in weariness, it has always opened itself to one like a book I could read, whose pages I had only to turn for any distress to vanish . . . "
>
> Alexis Curvers in
> *Tempo di Roma*, 1960

Obviously, these sensitive souls are reading into an arrangement of stones and plaster human meanings which extend their own life experiences. But what meanings do ordinary people find in the crowded centers, the slums, the sprawling suburbs of American cities? Or are we so busy doing, that we haven't time to experience the city?

How do expectations of the city differ between the city bred and the rural in-migrant, between the lawyer or banker and the sometimes-employed laborer? How different is the physical aspect of the city, as seen by the five-year-old, learning to fend for himself in a slum block, from that experienced by a middle class teenager in an affluent suburb?

Newsweek for November 20, 1967, says:

> " . . . most galling of all is the ghetto itself — a monochromatic preserve which, as the Negro psychologist Kenneth Clark notes, makes it brutally plain to the black man how little his society values him.
>
> "His housing is old, crumbling, rat-ridden, so desperately overcrowded that — at the density rate of parts of Harlem — the entire U.S. population could be squeezed into three of New York's five boroughs. Garbage festers uncollected on the sidewalks; building codes go unenforced; the streets are not even paved in parts of Houston's black quarter. 'The ghettoes in America are like the native reserves in South Africa' says Ralph Bunche. 'They symbolize the Negro as unacceptable, inferior and therefore kept apart.'
>
> "They symbolize powerlessness as well. Very nearly everything in the ghetto — its tenements, its stores, its politics, even its brothels and its numbers banks — are owned by whites downtown . . . "

René Dubos has written, "Irrespective of genetic endowment, a child who grows in a city slum will differ as an adult from one who has spent most of his life within the sheltering cocoon of a modern apartment house."

In writing about the diversity of humanity, Dubos said, "At the present time, unfortunately, the creeping monotony of our technological culture goes hand in hand with the monotony of our behavior, taste, patterns of education and of mass communication. And yet it is certain that we can exploit the richness of man's nature only if we make a deliberate effort to create as many diversified environments as possible . . . Diversity of social environment constitutes in fact a crucial aspect of functionalism, whether in the planning of cities, the design of dwellings, or the management of life. So far as possible the duplication of uniformity must yield to the organization of diversity."[4]

It has been charged — and rightly, I believe — that city planning has been overly concerned with order, with separation of different kinds of activities, with boundaries within the city. It is said that current practices of planning reinforce the growth of the ghetto and both economic and racial segregation in the suburbs. More will be said about this later, in discussing location and distance in the city.

Some have suggested that the over-emphasis on order extends to the visual aspect of urban design. Denise Scott Brown has quoted other architectural theorists that too much and too obvious order is displeasing to man, who may be better satisfied with a degree of ambiguity in the urban scene. Probably order of a kind would help produce a sense of serenity in residential enclaves; but in some places we prefer variety and excitement. Who wants Times Square and Broadway to be tamed and given drawing room manners?

To summarize, we believe that space in the city — indoors and outdoors — takes on meanings, to the occupier of the space and to the observer, — meanings of pleasure or pain, admiration or disgust, beauty or ugliness, monotony or excitement, high or low status, monumentality or hominess, respect or disrespect, power or powerlessness, security or insecurity, hope or despair, the confidence of knowing who and where one is, or the anxiety of restlessness and confusion, and probably many other messages or states of mind.

We believe that these meanings to the individual (influenced, of course, by the individual's past experience and by his image of his place in society) can be identified in three general groups:

First is the individual's perception of the actual functioning of the space to suit his expectations and purposes. Does it give him security and shelter, control his microclimate, provide enough room without crowding? Is it the right size and shape and arrangement to be suitable for his activities and his need for privacy or interaction? Does it permit or restrain the range of his activities, that is, does it enlarge or reduce his "life space"?

Second is the extent to which the space gives the individual a sense of well-being or pleasure. Obviously this overlaps with the other categories, but it includes the esthetic quality of the space, its condition and cleanliness. Happiness, to Linus, may be a blanket. To others — you name it.

Third is the set of meanings that may contribute to personality growth and development, to learning, and to a sense of personal worth. These include the development of social identity or alienation. But they may act in reverse. Is the slum producing the growing group identity and pride of "Black power"?

I must leave to the scientists among us to tell me whether or not I am asking the right questions, and what answers or qualified answers there may be. If there may be some answers, I suspect one will say, "it depends ---."

Location

The physical city, the collection of artifacts, is the shell of the real city which consists of the activities of man. More precisely, I have come to believe that what we call the "city" in an increasingly pervasive urban culture is essentially the locus of a high density of human interactions and of systems of interaction. The city's purpose in modern life is to facilitate interaction of many kinds. A city is a place where a lot of things happen.

Each individual plays different roles in various systems of interaction. In some of these his role is regular and habitual, as in employment or going to school, or being the father of a family. In others, although the system of interaction may be highly organized, as in marketing, the parts played by individuals as consumers may be irregular and even whimsical, but the statistical participation of the mass of consumers is fairly predictable.

Many of these organized systems of interaction are regional or even international in extent. The "city" may be the locus of one pole, or node, which may be a place of control in the system.

To participate in systems of interaction which become institutionalized, individuals or groups form establishments, which carry on habitual or repeated kinds of activity at particular places. These establishments become bases of operations for the groups, and also for the individuals who are members of them.

The establishments — homes, schools, factories, etc. — require sheltered space for their operations. Their requirements for this space are of two kinds, physical and locational. Land economists tell us that individuals and groups seeking to form establishments bid for preferred locations in the real estate market. Those with greater economic ability to pay for space are most successful in satisfying their physical and locational requirements.

Thus there is a tendency for establishments to locate in the places most favorable to them. Since they are parts of larger systems of interaction there develops a certain approximation of system in the total urban locational pattern. The social ecologists a generation ago described some of these patterns.

Since the organized systems of interaction, as well as their participants, are constantly changing, the establishments frequently change their physical or locational space requirements. Thus the locational pattern of the city is constantly being adapted to changing functional requirements; but this adjustment is said to be "sticky" and to lag behind changed needs because of the relative difficulty of adapting the physical shell.

The physical shell of the city is inherited from past generations and represents a large capital investment. It is adaptable, slowly, to the needs and requirements of users who have the economic ability to change it. In many ways, the obsolete physical shell restricts the choice of location of participants in the systems of interaction. The physical configuration in various parts of the city limits the range of possible styles of life for residents in those locations. Another reason for imperfect locations of establishment (particularly homes) is the lack of knowledge of the actual range of locational opportunities open to them.

To overcome imperfect location, or the "friction of space" as it has been called, city people have developed transportation and communications systems. Thus these systems for moving people, goods and information change the relative locational characteristics, or the relative accessibility, of the various positions on the city map.

Each individual, as he moves among his various bases of operations (e.g., home, school, work place) and customary destinations follows what sociologists have called his "Indian paths" through the city. For some people — generally of higher socio-economic status — the range of travel in the city is very wide. Thus their cognition of the city's pattern and resources — or opportunities for interaction — is broad and inclusive. For many of the poor, lacking an automobile or even the ability to spend bus fare freely, travel — and thus "life space" — is very limited. Note I am not claiming that this is the only influence limiting "life space", but I believe it to be one factor.

Social workers tell me that many of the poor are unable to travel far from their homes to visit social agencies or health clinics, because their knowledge of the city is too limited, and they become confused.

Rilke, in 1907, wrote of the city as a school. It seems evident that if one does not know the locations of the classrooms — opportunities of urban life — or cannot follow the corridors, the school cannot be very effective.

For the young, of course, the school is the neighborhood in which they live.

America's major domestic problem today, in my view, is the widening gap in economic status, in opportunity and in group identity and self-respect between the white majority and the dark-skinned minority. Recognition of this has caused estrangement, widening social distance, mutual distrust and a breakdown in communications between the groups. Certainly the prejudice of the white majority is a national — or international — phenomenon; but it helps to cause and reinforces the growing size of ghettoes in the cities, and their pernicious effects on human development.

Certainly one could debate the benefits and costs of various degrees of homogeneity or heterogeneity of residential areas occupied by various population groups by socioeconomic status, ethnic majority (e.g., the Polish in Philadelphia) race, age, etc. For the Swedes in Chicago a certain degree of segregation in locality and in institutions reinforced their group pride and personal morale during the years when the second generation were in school. But enforced segregation through discrimination has the opposite effect. So the effects of patterns of residential location seem to depend on non-physical attributes of a particular situation. In general, we tend to believe today that a certain degree of socioeconomic and ethnic mixture is desirable for the health of the society. And no man should feel that his family cannot have free choice of residential location within his price range.

It is claimed that the larger ghettoes reinforce the "culture of poverty", preventing children who grow up there from having any association with the prevailing values, manners and customs of the society. It is similarly claimed that all-white, middle class suburbs, deprive their children of first-hand knowledge of social reality.

Again, the large ghetto prevents easy access by the residents to needed services, cultural centers of the city and jobs. Inaccessibility of these was partly blamed for the Watts riot in Los Angeles.

One of the reasons-for-being of the large metropolitan area is the fact that theoretically it provides access for the worker to a variety of job opportunities. When jobs of all kinds were concentrated in the central parts of cities, the radial transit systems made them accessible to a large part of the population. In recent years the jobs in goods-handling industries (which have generally demanded lower levels of skill) have been more and more relocating to outlying sites, which has tended to cut them off from the lower skilled residents of the inner city. Persons-assembling jobs, largely in offices, have been concentrating in central areas, but these jobs have not been open, in general, to ghetto residents.

A study in Philadelphia showed that over three-quarters of the principal wage earners in households located in suburban counties, also worked outside Philadelphia County. Most of these drove to their work in half to two-thirds the time city residents spent on the journey to work. This is contrary to the stereotype of the suburban father who spends so much time travelling to and from work in the center of town, that he cannot adequately fulfill his family role with his children. Probably this is true only for a minority of suburbanites.

As I have indicated previously, city planners in the United States have tended to over-emphasize separation of land uses and building types in areas of the city, and to use zoning to enforce this separation. This legal tool has been used in many suburban areas to maintain their segregation by economic level, and thus in general, by race.

Some writers have stressed the values to be found in less homogeneous residential areas. The late Catherine Bauer Wurster[5] observed that children growing up in a neighborhood need to see people at work as part of their education in life. Jane Jacobs[6] made a strong plea for the urban mixture of such areas as Greenwich Village.

Another characteristic of the city related to location is density of population or intensity of development. I have already referred to the density within dwelling units, as in Singapore. Its effects may be felt in the spreading of contagious diseases, in lack of privacy, or in crowding which, in some societies, might tend to encourage "street corner society" and a diminution of family solidarity. Incidentally the extended family seems to remain strong in Singapore. (I suspect that the latter may occur also in a household with many rooms and few people.)

I have tried to find out from social scientists what they believe to be the social or personal effects of population density over larger residential or business areas of the city; but so far I have found no clear answer. They mention the famous rat experiments in which high density *within an enclosed space* resulted in neuroses and lowered fertility. But I suspect that high density in which an individual participates of his own free will is another matter. Midtown Manhattan has overcrowded lunchrooms, streets and subways, excess noise, confusion and probably an overload of information coming to the individual, but new establishments are constantly locating there, and building skyscraper monuments to themselves. Who knows the effects on the various individuals, the company presidents, the clerks who commute to Queens, the taxi drivers, the sandwich makers in luncheonettes?

I suspect that many of the effects of high density can be ameliorated by architectural design. Maybe this is constrained by our present system of land tenure and real estate development. In residential areas, too, high density may have one effect for persons of high income who can range widely over the city or region, and can get away to the country for weekends and vacations. It may have quite a different effect for the poor who can't afford a vacation.

At the other end of the scale, do children in low density suburbs, who have to be driven by their mothers to social appointments with other children, feel any handicap in their socialization? It probably depends more on their home and school environments.

It is evident that the transportation system of a city has its social roles in mediating locational influences on socializing, work or other interactions, and on perception of the locations of opportunities for personal development and interaction.

More light on the influence of the urban locational pattern on personal development and welfare may be produced in research on "urban activity systems" as distributed in time and space, as suggested by Chapin.[7,7a]

Another direction of further study which will probably be fruitful in this regard is that suggested by Melvin Webber who speaks of space-related and non-space related interaction systems. He indicates that the relationships, or "community" of the jet set or top managers and professional people transcends the limitations of space and may be national or international in character. (I suspect this may not be as true for many of the wives and children of this class.) On the other hand, Webber[8] quotes a number of sociological studies indicating that working class and underclass people are very much space dominated in their patterns of relationships and are very space conscious. Apparently the higher in the social scale, the wider the horizon of the individual, and of his perception of opportunity. The substitutability of communications for persons movement with modern technology reinforces this relationship.

This brief and superficial statement of the ways in which I believe we should look for influences of the physical city on the development of the individual has given no assured answers. It has suggested that the influences of environment are complex and interacting. It has suggested that one should consider the physical environment in three ways: in its direct biological or physical effects; in the functions and meanings of space and place; and in the locational patterns which determine accessibility. It depends ---.

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SANFORD KRAVITZ, PH.D.

I have been fascinated by Robert Mitchell's very erudite discussion of the possible range of effects of the many aspects of the physical environment on people. I must quickly add that I have read and listened with a mounting sense of frustration.

Coming from the field of social policy and social planning, I look to physical planning theoreticians and to research to give me a more rational framework for planning — at least more rational than what I can get out of the political arena, or what I get out of plans based primarily on the values of my colleagues or myself or the monstrous compounds of our collective experience.

I would like the physical planner to be able to tell me and to tell policy makers, "This is what we know and these are the basic requirements for the physical environment." As I look around, I don't see the physical planner having that impact either on social research or on renewal or on physical planning, transportation or social policy.

I would like to make it clear that I don't hold Professor Mitchell personally responsible for this.

If one looks at the array of problems that we have perpetrated through urban renewal, through our public housing efforts, through our highway construction, through our suburban sprawl, one wonders whether we have ever made any effort to apply what minimal knowledge we do have.

I would pose the question whether continuing attention to longitudinal research using someone else's money may not be immoral, faced with the present state of people in our cities. That may be shocking to some of you who are living off it. The question I have is: How are we using what we have?

Despite Robert Mitchell's presentation of the alternative ways of viewing the problem and his recognition of the psychological and social requirements, urban planners appear to be looking at the city in the unidimensional way. They appear to be failing to consider cities and neighborhoods truly ecologically. They do not appear to be looking at wholeness either in terms of the sickness variables or the health variables.

On the social planning side, we are equally culpable. We have been long satisfied primarily to proliferate services in response to individual malfunctioning. And we have not seriously bent our efforts toward any consideration of the total living environment of a community.

If we do look closely at where we are now and try to look ahead, what do we see? Man now and Man of the 1970's is first and foremost a vocational man. All of his other activities, relationships and interests appear to be subsidiary. He is increasingly trained to do a specialized job and not to be a man in the fullest sense. If he has a good job, he has a better chance of his life having meaning, purpose, a possibility of happiness. If he has no job, he really has no life or no being.

Man today and predictably increasingly is haunted by a deepening sense of powerlessness, a feeling that in his community, his neighborhood, in politics, he can do very little or nothing. He knows that political decisions do not rest with him, and he cannot effectively influence them.

I think Western man today and increasingly in the future is faced with an increasing inability to adjust to his environment — to lack of living space, to increasing noise, to a mechanical rather than a biological space to live. Mitchell described this quite adequately. Western man today is continually prey to anxiety.

If he is poor or Black, he has tangible reasons for his fear. The boss, the landlord, the welfare worker, the loan shark, the cops, the sheriff, the school teacher, the fast-talking salesman, the white store owner collectively present continuing demands. They are colloquially called "the Man".

Man is drowned in a glut of news which he is ill-equipped to grasp. Confronted with all this, it is understandable that the individual feels increasingly that he is caught up in an implacable process. All around him, there are irrevocable decisions which effect him vitally, but in which he has no say. I submit these are quite general problems, but if we were to place a lens over the ghetto, in particular, we would find all of these rays converging. We would bring into searing focus the picture of Negro poverty, or rapid urbanization, modern technology and affluence in the state of the world.

What would we see through this lens? Much of what Professor Mitchell has already noted. First, of course, is poverty. It is not simply the lack of money, but a poverty which affects every institution of this society within a society. Men cannot earn a decent wage. Sometimes, they cannot find a job at all. They cannot, therefore, establish a family. And those unable to meet responsibility are often driven to deny it.

Thus, the Negro child is born, not only into material poverty, but often a poverty of family life deprived of important sustaining relationships. As he grows older, he is sent to overcrowded schools which do not teach and where minimal order or discipline rather than learning is the principal objective.

As he grows older, he discovers his job opportunities are narrow and scarce. Negro unemployment is actually growing. The gap between Negro and white employment is widening, and the rate of joblessness among teenage Negroes is astronomical. Thus, the incentive to learn is eroded because there seems little point in an education which is miserable in content and which leads nowhere.

When he drops out, and often even if he finishes school, the prophecy is fulfilled. There is little opportunity to sustain life decently and little hope that hard work will bring rising income. And so the process starts again with his children.

This cycle of poverty breeding poverty is immensely darkened by the conditions of the modern city. The ghetto dweller returns every night to squalor, to overcrowded rooms, to a crumbling building without adequate heat or plumbing and where the battle against filth is unendable and unwinnable. The boy or girl has no place to play where there is any contact with nature. They are jammed in with thousands of others who share their plight. The resources which help the rural Negro endure material misery, the natural open spaces, a sense of community and of fruitful contact with friends and relatives, are all denied him, while the noise and filthy air, the crowded streets and the continual press of other people, I believe, really rub raw the nerves already raw.

All around him, only a few blocks away, on the screen or on his television set, he can see the other world, the white world, a world of well dressed children and neatly furnished homes, or private cars and well kept lawns, all the marvels of an affluent America.

It is not the simple facts of poverty, degrading as they are, which breed violence; it is, especially for the young men, the hopelessness of his own future and the savage contrast which is forced upon his consciousness.

To talk about microapproaches when this is the scene is to offer smelling salts when his patient is strangling, to offer Band-Aids when the patient is bleeding to death. The immediate problems are so critical that I believe it is necessary for all of us to place them at the very top of our agenda of concerns and to begin to discuss these issues as the central issues wherever we are.

We must begin to talk to our colleagues, to our communities, to our leaders, about these issues. The message of this past summer* to which I add my support (I am not offering a new concept), is that we must reappraise our priorities.

I believe there are two central issues that must be addressed both with immediacy and at a scale sufficient for massive impact:

They are jobs and housing.

There is a third issue which is less concrete, but even more pervasive. It is combating the growing sense that ghetto dwellers and many others have that they are not in control of their own destiny, that they are at the mercy of myriads of bureaucrats who control all aspects of their lives and those of their children.

Man is a vocational man; he must work for dignity in the eyes of his family and in the eyes of the community. We need, therefore, a vast public employment program that is available to every able-bodied individual who wishes to work.

There is absolutely no question but that this nation can afford this. In fact, our productive capabilities are so great and accelerating so rapidly that a much more rapid increase in living standards than we are now achieving is essential to the full utilization of our productive powers. Without really wincing too hard, we are spending over $30 billion a year on the Vietnam War. Economists such as Keyserling, who are often suspect, I admit, tell us that we must speed up to prevent our new technology from becoming a Frankenstein rather than a blessing.

A second necessary program is the development of a vast low income housing program in which, as a matter of urgent national priority, we set out to provide decent and safe housing for everyone living in squalor. This means five million new or rehabilitated dwelling units in ten years. It can be done at an estimated cost of $50 billion dollars.

It means harnessing the productive capacity of American industry and our technology and our capacity for technical innovation on behalf of the slum dweller. The beginning plans for such an effort have been on the drawing boards for almost a year and nothing has been done about it.

Having said this, I must hasten to add that I really believe that physical environmental manipulation is terribly important. I have a recurring thought as I have written this and as I say this. Two of the most beautiful places I have been to in the United States are the Navajo Indian Reservation and Wolfe County, Kentucky. In both places, I have seen the most searing physical poverty.

The Indians seem better at managing some semblance of wholeness of life than the "hollow" folk whose misery and despair are really beyond belief. How important is this magnificent physical setting in helping them sustain life despite enormous handicaps and hardships?

And yet, when I think of what must be done about income, about jobs, about housing, about education and, above all, about a sense of control over one's destiny, I do have a feeling that time is running out. And I would have to admit honestly that if one believes that time is running out, maybe one should not in good conscience appear at a conference on long-range research possibilities.

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*The summer of 1967 was the period of the severe riots in many American cities.

RICHARD L. DAY, M.D.

I have read of an ancient form of Chinese medicine in which the doctor is not permitted actually to enter the sick room and look at the patient. He must base his diagnosis on the shrieks and groans of the sick man. Meanwhile, the anxious family stand around wringing their hands and weeping. This system of diagnosis is hardly a good one, but all too often it is what is practiced when it comes to our sick society. Sanford Kravitz, the previous speaker, and this entire conference have wisely chosen a better approach. The patient has been examined and an attempt at analysis is being made before treatment is recommended.

Seldom is such a wide range of talents and interests focused on a single problem as we see assembled in this conference. But the problems of individual growth of a man and of the health of a society are so complex that even such a collection of diverse talents can do no more than make tentative approaches.

Unfortunately, there may not be much time left. Signs of social disintegration, at least in the United States, are apparent to the most casual observer.

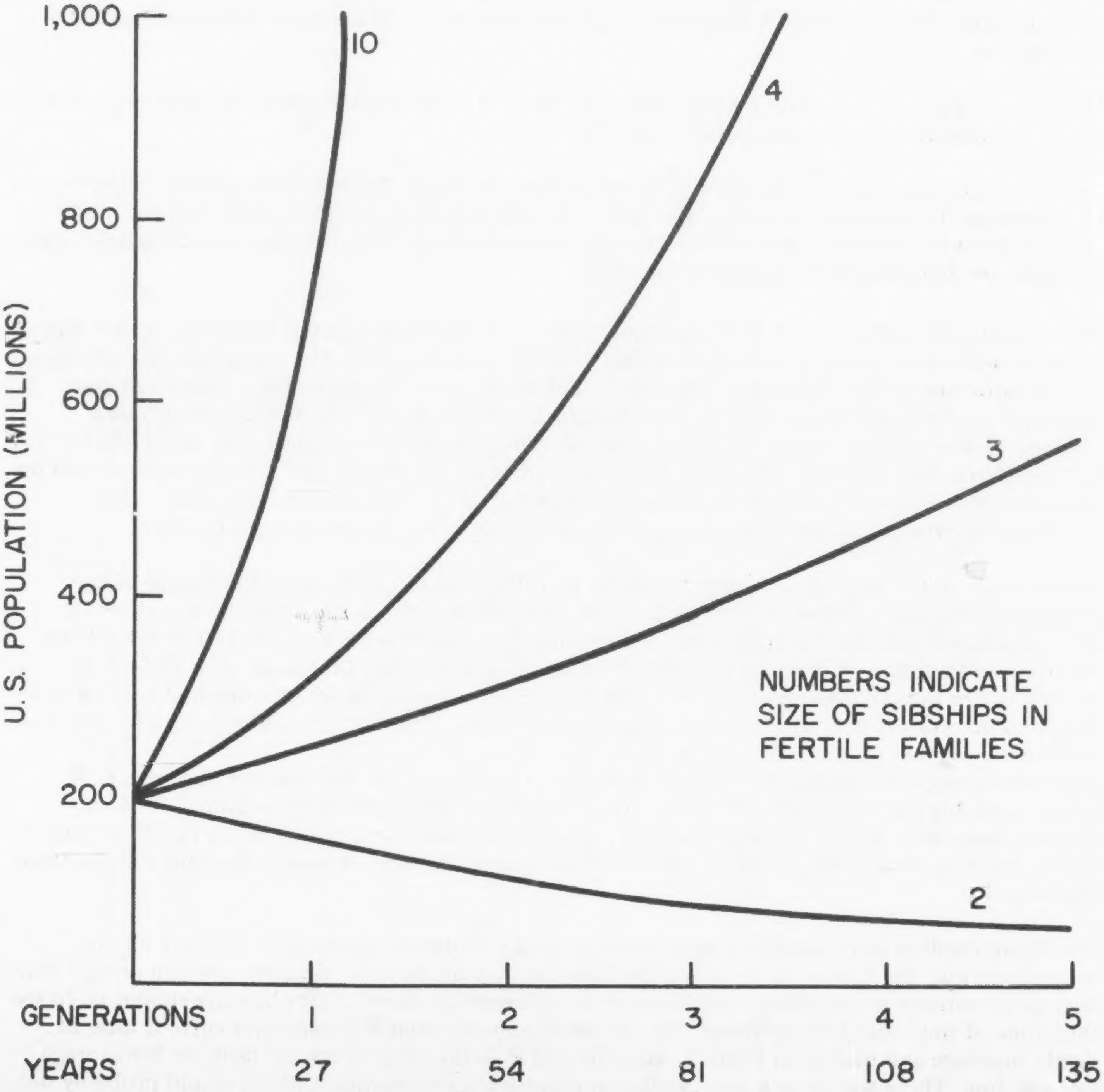
From previous speakers we have learned of the influences which determine the quality of growth of an individual. The molding of a man, we have been told, begins even before birth, and continues through infancy, childhood and adolescence. By high school age — and perhaps much earlier — basic attitudes are determined, for better or for worse.

My interest is in family planning. We all know that the wanted child who receives loving care and an adequate education grows to be a more stable member of society than the unwanted. Nevertheless, it is an unfortunate fact that many unwanted children are born. Owing to the injustices of our system of medical care, those women able to afford a private doctor can and do get adequate medical advice in this as in other aspects of health. The poor get less medical care, give birth to more children then they say they want, and have a poor health record. Our country cannot hold up its head with any pride so long as any family is deprived of its rights to complete health care, including knowledge to permit fertility control. Our goals in this respect should be clear.

But there is another aspect to fertility, namely quantity. I need not dwell on the figures of the population explosion before such an audience as this, so far as the world situation is concerned. What is not generally appreciated is that our country also must take a deep interest in the subject. We have a population problem in the United States, despite the fact that more than 85% of our women use or plan to use some form of birth control. Our fertility is under individual control to a large extent, and yet the numbers of children wanted, easily afforded and actually born to American women is such that we are travelling toward a time when our resources for decent living conditions, good education, clean air and healthy recreation will be inadequate. Despite our poor record in infant mortality, as compared with many other technically advanced nations, over 95% of our children born alive do live to complete their reproductive years. This means that a family of only 3, 4 or 5 children, which used to be considered small, is actually large. A simple diagram will illustrate this (Fig. 1).

The figure displays four possible curves which project population of the United States for five generations into the future. Quite obviously these are not predictions, since no one can predict what changes in natality and mortality will develop to influence the trend. Our objective should be to see that none of these curves is achieved. The lowest line shows what will happen if current rates of death, marriage and biological fertility continue and if *fertile* couples should bear, on the average, two children. There would be a slow decline in numbers, a circumstance which would probably not be good. The failure of two children per fertile couple to trace a horizontal line (stationary population) arises from the rates for celibacy, biologic infertility and deaths before the end of the reproductive years. These were taken to amount to 20% for each generation, a figure which is somewhat arbitrary; the true figure is probably closer to 16 to 18%. The projections for 3, 4 and 10 children per fertile couple were similarly constructed.

Already 85% of our women practice birth control, and the popularity of the pill, together with increasing distribution of medical care, will eventually provide every woman with free choice in this matter.



Population growth per average family size.

What will that choice be? The much admired family of 10 is not likely to be the style for the future. Should it be, our population would jump from 200 million to 1,000 million (one billion) in a little over one generation. Even the most sanguine pronatalist can hardly assert that we could take care of such a mass of people. The fact is, we are falling far short of handling the problems which we now have with a comparatively small number of only 200 million. If the choice averages out to be only three, the inexorable increase will lead us in the long run to a decline in standards of living, something not likely to be tolerated by a once affluent nation. Civil strife far worse than that now witnessed might be the result. Our current rate of increase is equivalent to this rate or perhaps a bit slower, and too much of our energy is devoted simply to maintaining the gains of the past; improvement which could easily be obtained for everyone, and especially for the poor, is forgotten. The future lies in the mysterious heart of womankind, with perhaps some advice from her spouse. Attempts to guess what the future holds may be futile. Certain nations, such as Japan, where abortion and birth control are available, show that fertility can be brought into equilibrium with mortality.

Milton Senn referred to a study conducted by Donald Straus and me. We wanted to find out what one type of family advisor, the pediatrician, thinks is the ideal family size, all considerations other than child health (mental and physical) being left out of consideration. We polled 100 pediatricians, and got 50 answers. Only two respondents said the question was foolish. The average number chosen by the 48 pediatricians was 3.26. This is very close to the ideals expressed by young American women, according to a paper by the demographer, Judith Blake. *(Population Studies* 20:27, 1966). These ideals haven't changed much. The low birth rate of the depression years resulted from spacing of children, and not, as was mistakenly thought at the time, from a decline in desired or completed family size.

The American dream is of liberty. With liberty goes responsibility. Society has a stake in responsible parenthood. The Pope expressed this well when he said is his encyclical of March, 1967: " . . . Finally, it is for the parents to decide, with full knowledge of the matter, on the number of their children, taking into account their responsibility toward God, themselves, the children they have already brought into the world, and the community to which they belong."

It is perhaps too much to hope that the best interests of the individual family will coincide with what is best for the nation or the world. In India it has already been seriously suggested in their Parliament that compulsory sterilization be exacted of all men who have already begotten three children. The suggestion was not taken. However, monetary rewards are given to those who do accept sterilization. There are 87 nations which have population control programs. When one realizes that kwashiorkor is the commonest childhood disease in half the world, the fortunate situation we enjoy here is poignantly brought home to our consciousness. The goal of this conference is to make it possible for every child to grow to full potential and responsibility as a citizen. A stationary population would make reaching that goal easier, and may be essential to its attainment. To achieve a stationary population, we must begin with two steps; namely (1) birth control must be available to all and (2) abortion must be permitted without restrictive legislation.

DISCUSSION

CONRAD HERR: Dr. Kravitz, one of the things that bothers us is the problem of automation, the problem of the consumer economy. Right now and for the next ten years, we could build houses and employ everybody, it is true, but eventually we will be able to produce the kind of material that we have today with far fewer workers.

In the coal industry, for example, we are digging as much coal now as we ever did, with half as many in the labor force.

If man is a vocational man, what are we going to do with half of the labor force that is out of work?

KRAVITZ: You have raised an obviously serious question about which a lot of people are talking and about which it is very difficult to get any kind of consensus.

As I look at the immediate future, I see an enormous amount of work to be done that is not being done or is not being done well. I think it is inevitable that we are going to face within the next several years a decrease in the size of the work week and increasing redistribution of the amount of work available among people.

I think there are lots of other things than can happen. For example, reduction in retirement age or holding people for longer periods before they go into the work force so they can go into the work force with better preparation. We do this now with middle class and upper middle class kids who stay in graduate school until age 30. And it is very socially acceptable. Or 35.

But I think this means we will begin to rethink our concept of what work is. Also our concept of what education is. And some combination of the two which doesn't have implied in it the Protestant ethic: Unless you are working, you aren't producing. So we may keep people in an education-work-service kind of environment until age 25.

Maybe we can also keep them from reproducing, but the trend seems to be in the opposite direction. These, I think, are some of the issues that face us.

I hasten to say that I don't have any quick answers. But I think that for the next generation there is an enormous amount of work to do. I have no illusion that even if we started tomorrow to build 5 million dwelling units, we would get it done in ten years; nor that there wouldn't be a need for more to accommodate population growth. The need is going to be there, but I think these other aspects have to be considered.

EUGENE H. STIVERS: Dr. Kravitz, what will it take to get that housing program off the boards or wherever it is?

KRAVITZ: I think it will take some commitment at the highest national levels. There is, I think, an enormous readiness on the part of industry in the country — even some readiness on the part of labor unions to begin to think more seriously about this problem. And obviously, there is an enormous amount of interest at the local community level.

I really think seriously that it is the war and the way in which we have arranged our priorities that has kept us from moving — primarily that. But it is not that the ideas aren't there or that at least a beginning know-how isn't there.

I wonder whether Professor Mitchell might have some ideas on this.

MITCHELL: I first started working in a public housing program in 1934. At that time, we were convinced that if we could build projects large enough to protect them from the dirty slums around them, we were doing the job.

It seems to me that for a housing program of the size and speed implied by this, there are going to have to be some very hard decisions of policy in cities and in metropolitan areas. Are you going to build all of these new houses in the present poverty areas, with the assumption they are for poor people? You say you need more houses for poor people. Are you going to expand the ghettoes?

There are some people in the Black Power movement who say, "Yes, let us stay in the ghetto and develop ourselves." And I rather suspect that a certain aspect of Black Power which builds respect for the Negro on the part of other people is going to have to be preliminary to the degree of integration that we have been talking about. But where are you going to build these?

You may be interested in a very good paper read by Tony Downs of Chicago before the Ribicoff Committee on the strategy for the slums (the strategy for the ghetto, he calls it), in which he points out the major strategy decisions have to be made between enlarging and keeping people in ghettoes and making it possible to disperse people over metropolitan areas to the extent that some mixture occurs and some opportunity for people to live in more than one place.

Now, this requires a decision that politicians, in the present disorganization of the decision process in our metropolitan areas, have been unable to make. So that I am not sure we know everything we need to do nor are we prepared to make the hard decisions that have to be made at the local level in order really to carry out a program, even it we could spend this money on housing instead of killing people.

VAUGHAN: I wonder if some of our panelists, in connection with a disappearing segment of the labor force, would comment upon the need for and the possibilities of the development of the kinds of services that have been called by Seymour Melman and others *human services* — in the health field, for example.

We complain of a shortage of nursing, and we haven't made nursing very attractive. We complain of a shortage of professional people in social work, in child care, in homemaking. We look for people to come into the hospitals and take care of infants in a way which mitigates the evil effect of hospitalization on many infants.

We need human services in the beautification of cities. We need gardeners to keep our streets beautiful. And we need other people to keep them clean. There are many cities in the world where trash is removed every day, instead of once a week and in a sloppy manner. We need human services to improve the comfort of living in cities.

In London, it is a convenience to have someone drive the bus and another person take up the tickets. Things move along a little faster. We have other amenities that could be attached to travel to make it more comfortable, which involve people. We have a need for expanded services in art and in creativity.

And we need to answer questions about the use of leisure time in addition to those involving work, education and service. There is going to have to be a development of creative attitudes toward leisure time.

HERMAN NIEBUHR, PH.D.: Before the panel replies, may I document Victor Vaughan's concern?

In a study we have just completed using a moderate quality criterion for services in the human and community areas, we estimate that we are at the present time two million short of meeting our national objectives in this area, and that this will go to 5.1 million by 1975.

KRAVITZ: I would say amen. This is what I was implying in my earlier comment on the amount of work to be done.

I think that part of the problem is that people like us, all of us in this room, talk about this thing in conferences, but that very little of it, I suspect, gets translated into a form that social policy makers, legislators or people who made budget decisions can deal with in any way.

We have, you know, a modest program in the Nelson-Kennedy-Javits legislation concerned with the training of people for public service jobs, but nothing on a scale that really can cope with the problem. We haven't done the work that is required with a whole series of professional associations and institutions that must mediate the entry of people into these professions.

The social welfare profession, my own profession, is still enormously resistant to this. The teaching profession and the medical care profession are each still struggling with its own problems around this. In the Columbia Point Project, I understand the doctors are still very uncertain whether they want neighborhood people who are family aides sitting in on the medical care team, you know. This is an intrusion on professional responsibility.

We have a lot of these kinds of issues we still have to grapple with, but at the same time, I think it is encumbent upon us to be calling these problems to the attention of policy makers and to help them frame the kinds of programs that are necessary.

HERR: The physicians at Columbia Point were actually quite ready to share with community people the responsibility for patient care. It was our social services staff that blocked it. They were concerned with the nature of the confidentiality of patient information. They held very firm to this.

My other comment, I want to direct to both Robert Mitchell and Sanford Kravitz. As I grew up, there was a lot of feeling that being in service was dropping in status; even as I was growing up, people didn't have personal servants any more, servants who drove things, servants who gardened things. Such occupations were dropping in status, and being replaced by positions in the industrial technical revolution in our country.

Now, can we undo this? Can we reverse this trend at all? People won't be in personal service, this is true, but the feeling in England of being in service is very different from the same feeling in the United States — especially in respect to being in service to *anybody*, in contrast to being in service to *people.* The physicians in England do not really think that they are in service to the public, as many physicians in this country feel, I am sure. And I don't know if we can reverse this trend in this country — it's a problem of motivation.

KRAVITZ: I don't have a formula for reversing this trend or a ready answer; I have another comment. And that is that there are examples you can look at for directions, one of which is the Teamsters, where unionization and the capacity to meet and negotiate for a living wage has changed the whole image of that profession. One used to say, "Well, he is only a truck driver." Well, he is a Teamster now. In many cases he wears a uniform, and he has a union in back of him. This has changed the whole image of that profession.

I have had interesting recent conversations with people about new kinds of industry for the ghetto. Black leaders are talking about taking over the service industry of service and maintenance. And they are talking about it in a different way from sending Joe out to sweep somebody's floor. Joe is going out with a uniform, as part of a business. And he gets paid a decent wage. He operates a waxing machine, but he is part of an industry which has an industrial quality to it. He has behind him an organization. It is a much different image from the "service" or "personal service" that you implied.

NIEBUHR: The discussion has thus far focused on immediate priorities. Robert Mitchell has reminded us that there are basic questions that need to be answered before we can have confidence in our near-term or our long-term solutions. What is our strategy for getting at some of these questions?

MITCHELL: Yes, there are long-term and short-term questions. I am quite convinced that we are still going to be here and still going to be needing to make decisions ten years from now and twenty years from now. If it weren't the case, I wouldn't be in the education business. And I hope that the decisions that we make twenty years from now can be much better based than the decisions we can make today.

City planning is changing from a profession which makes physical pictures to hang on the wall of what it would be nice if our cities could be like twenty-five years from now to a profession which is beginning to work in terms of programs of action, of strategies for development, of perhaps alternative strategies against the uncertainty with which we have to compete in planning.

I would like at this point to say that I would much rather have given Sanford Kravitz' paper than my own this morning, because I really think this country is on fire and is going to burn harder. If you have ever heard a real sharp, clear, hard Black Power speech saying, "I hope you burn," you may have caught something of this feeling. I think I understand what is in back of this, and that there is an urgency to this.

The tendency today, on the other hand, is to say, "We have got to put everything we have into solving immediate problems and put everything we have into the equalization of opportunity and into social justice programs." May I suggest that I hope a certain proportion of us will continue to be concerned about the search for excellence and the pursuit of excellence as a long-term need in our society.

I think that very often we have to make a hard policy decision, in allocation of resources, between solving immediate problems having to do with social justice and of investing in those things which will ultimately raise the level of whole society and of our culture. If we could really have that choice instead of spending it on the destruction of a country, I think we might have a healthier nation.

CANOSA: I would like to make a comment about Dr. Day's presentation.

I have been in Colombia and in Guatemala, and I am a little bit concerned when you are talking about cities. In Latin America, there are no cities. The population in Guatemala and in Colombia are much worse off today then they were 30 years ago. It is not only the problem of increased numbers of people; it is that the greater numbers of people are more uneducated because there is a lack of teachers. And they are going to be hungrier than they are.

So besides numbers we have the quality of people that we are going to be facing, and are already facing — they are madder and hungrier. I don't know if they will go past their borders, but it is my feeling that within twenty years anybody who is going to wear a tie in South America is going to be shot — or is going to be eaten, because the people will be hungry.

So my concern is more with population control, with hungry people and with uneducated people. I know that you American people are going to solve your problems. I have no doubt that within ten years or fifty years, you are going to build houses, you are going to have more beautiful communities, but what happens to the rest of the world?

DAY: Thank you very much for your support for my point of view that family planning and birth control are extremely important. The reason I confined my remarks to cities was because that is the subject of this morning's panel; and partly, I didn't want to talk about other countries for fear of being impolite to those countries. But since you have said that there is this problem in other countries, I would like to say that I agree with you.

Everyone who has traveled in those countries and those people who work there seem all to agree that the sudden imbalancing of the equation between births and deaths is bringing about more misery than we had before. It is worse to have 5 starving children than 3 who died and 2 who lived. The impact on the individual family is more traumatic, worse; and in human terms, it seems less desirable.

It seems to those of us who worry about population problems that there is absolutely certain to be a time when births and deaths will become equal. This is not our choice. This time is going to come. Our choice is whether it is going to come by some rational planning and birth control or whether it is going to come by war, famine, disease and murder.

There is no other possibility. There are no other alternatives, it seems to me. And so when I listen to city planners, I think this is great, but wouldn't it be even greater if they could count on a stabilization of populations. And this they cannot count on anywhere, excepting in those countries which have liberalized their laws on abortion.

Birth control has not been enough anywhere in the world to solve this problem so far. I believe that we have made some advances in this country in terms of our abortion laws in attacking the misery in certain states that now permit abortion where the baby is going to be defective or where the mother is desperately sick, but these laws are not going to attack the numerical problem. The numerical problem is the child who is conceived by parents that don't want him. And this will continue because the perfect birth control methods aren't here and aren't going to be here. It takes individual decisions on the part of any individual people. It is a public health problem completely different from any other.

The planners can plan cities. This population problem can only be solved by individual decisions by individuals.

MITCHELL: May I say that I was recognizing the urgency and importance of this aspect of the problem in Latin America. There is another consideration and this is that just as in the United States, those in positions of authority who can make decisions are not prepared to make those decisions which would bring the large majority of the population into the 20th Century. There are two societies in Caracas and Bogotá or Santiago, or wherever you may be. You have a society of a few cosmopolitans who are as far advanced in our culture as anyone in the world, and a large society of very great numbers of people who are, many of them, immigrants from the countryside, where they couldn't survive, into the cities, into the shacktowns on the edge, where they still don't have a chance. They are not living in the 20th Century.

The problem is serious of the present political unwillingness or impossibility to make the hard decisions regarding the allocation of the country's resources and its income which would make solutions possible. I talked last March with the Mayor of Bogotá. They are very much concerned with housing, but he is expecting that city to grow from its present 702,000 to something well over 4 million not too many years from now.

And I asked him, "What would you consider to be your most important problem?"

He may have thought he was talking to a physical city planner. He said, "Number one, water supply. We don't know where we will get water for all these people. Number two, sanitation. Number three, transportation."

But I think the real problem is one that he either couldn't or wouldn't talk about.

STEPHENS: As I have listened to the discussion this morning, I have been wondering whether we are making the war a scapegoat when we say they are spending on the war? We found no answers to these problems before the war, and have found none during the war.

Our problem is Philadelphia is *our* problem. It isn't San Francisco's problem. The problem is never the same in two different locations. Perhaps we should address our attention to Philadelphia now and let other people be concerned with Vietnam if they want to.

FRANCES VANDIVIER: I think there *is* a relationship. This summer I was on the playground with kids who had mostly broken glass flying around. At the same time, news came of the ground attack on the airships in Vietnam. I guess $85 million or so was lost in that one wipeout. I couldn't help but feel that there was some relationship between broken glass and the lack of facilities.

HARRIET FELTON: In these sessions we have been raised to pinnacles and five minutes later dropped down faster than we went up. We have heard the word "power" used in a number of contexts. It hasn't been described or identified or equated. The word appears, and we move away from it. This change of mental state is very trying, but it is stimulating and exciting. And I think I have had the feeling of a sort of hopelessness at times. I would like to tell you what I find to balance my hopelessness from the position that I now occupy, which is Regional Medical Director of the Children's Bureau in the Middle Atlantic States.

Just at the time I came into the Children's Bureau things loosened up, and we have had in the regional office four and one-half years of the most dynamic, moving excitement. We have had the opportunity of watching groups of people become banded together in support of the programs of Comprehensive Care for Children and Youth, among which there develops a very remarkable esprit de corps.

There is a power developing in each of these groups that is very hard to describe. You must really be a part of it to experience it and know it and feel it.

I would recommend to every one of you that you make it your business to acquaint yourselves with somebody or somebodies in one of these groups of very positive power. It is a power that flows from each individual to the other one. And the resulting aggregate, I say to you, is a spot of light. And there is something there that might be a medical service to this ailing patient.

It is more than medical because this is a very dynamic, vital, changing power. It moves far and has yet to move backward. I hope we can keep it moving forward and growing, and that we can find the right people to help catalyze this thing and help it to grow more quickly.

NIEBUHR: I think Harriet Felton's final comment is a useful one. A few years ago, Jane Galbraith in a very interesting article in the *Atlantic Monthly* talked about the American's penchant for stating his aspirations in the form of problems. It is interesting that these are reciprocals. The problem is the reciprocal of an aspiration and vice versa.

Perhaps we do draw attention to our aspirations by talking about the dire difficulties that we face. Perhaps it is also the statement of typical American optimism that we even make this kind of an analysis. We are an optimistic people. And although the glacier is always at our door, Thornton Wilder reminds us that we attempt to escape by the Skin of Our Teeth.

Perhaps we have in the past; whether we will in the future, I guess it all depends.

PART VII: INSTITUTIONS, ECONOMICS AND THE LAW

Paper by

Adam Yarmolinsky, LL.B., Harvard University Law School

Respondents

Samuel Polsky, LL.B., Ph.D., Temple University Law School
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Adam Yarmolinsky, Samuel Polsky, and Lincoln Moses examine the question as to how the institutions of society can be productively engaged in movement towards solutions of pressing social problems. The need for research is recognized, with it further recognized that social and political action rooted in enlightened public policy cannot await the results of long-term study. Action and research must move concurrently and urgently toward the remediation of developmental and social ills.

ISSUES IN HUMAN DEVELOPMENT: INSTITUTIONS, ECONOMICS AND LAW

Adam Yarmolinsky, LL.B.

This, I gather is where human development stops. Having raised the child from infancy, carried him safely through the perils of adolescence, and introduced him to the delights and temptations of urban life, I note that on the last afternoon of the conference you propose to leave the young man surrounded by institutions, disheartened by the dismal science, economics, and terrorized by the jealous mistress, law. If he survives the afternoon, he will be sadder, and perhaps wiser.

Institutions are the instruments through which society tries to foster and control human development. The allocation of resources among institutions, and the management of those resources by institutions, determines what effect society has on human development. New knowledge about human development cannot be translated into significant action except through institutions. The individual researcher can make significant new discoveries; the individual physician or psychiatrist can apply these discoveries. But even the systematic diffusion of new information necessarily involves institutions.

For some people, institutions tend to become ends in themselves. These people are called bureaucrats. They have many virtues, and institutions could not operate without them, but this is their principal failing. People who are not bureaucrats regard institutions as objects in the landscape within which human beings move.

Students of human behavior all stand before the same canvas — a landscape with figures. Some observers are inclined to take the landscape as it is. Others are restless to change it for the sake of the figures in the foreground. But anyone who has ever tried to change the landscape knows that it is likely to take longer and be a good deal more expensive than you supposed at the outset, and you may still be unhappy with the final result.

I could speak at length about how I would like to see the landscape changed in order to free up human development, particularly in places like the urban ghetto, where the landscape features are most confining. But I think it might be more useful for me to focus on the process of changing the landscape, and particularly the process of making decisions about what changes are to be made, in what order of priority, and on what time scale.

If one chooses one's goals without fully examining the feasibility and the costs of achieving them, one may end up deciding that you just can't get there from here.

Planning for changes in the institutions that serve human development is clearly the most difficult kind of planning there is. At one end of the planning spectrum is the Department of Defense, which has access to very large resources, and allocates them among many institutions it controls directly, in order to maximize the likelihood that certain institutions it does not control will avoid certain very limited kinds of undesirable behavior.

At the other end of the spectrum is the individual parent who has access to very limited resources and allocates them among institutions he does not control in order to encourage the most creative and responsible exercise of free will by his children who are moving further and further away from his control every day. Planners concerned with human development are a good deal closer to the situations of the parent than they are to that of the Department of Defense.

The institutions that affect human development are both public and private. The public institutions are federal, state, and local, and they cannot operate at any one level without affecting and being affected by the other two. Nor is there any standard pattern for public-private or federal-state-local relations.

Government funds are made available to private institutions by contract, by project grant, and by institutional grant. The Department of Health, Education and Welfare conducts most of its programs by formula appropriations administered through the states. The Department of Housing and Urban Development conducts most of its programs by direct allocations to localities on a first-come, first-served basis.

Most of the institutions we are concerned with are chronically starved for funds. Shoe stores are air-conditioned before schools and hospitals. School teachers are paid less than stevedores, and successful school teachers are certainly paid less than successful shoe salesmen.

When the U.S. House of Representatives voted to exclude employees of the Office of Economic Opportunity from a general civilian pay raise, it was an aberration, but an aberration in the general direction of the trend line.

The benefits of alternative resource allocations or institutional arrangements are extraordinarily difficult to measure in the field of human development, because the precise goal is by definition hidden in the future and not precisely predictable. Similarly, some of the most significant costs may be future costs. These benefits and costs are significantly harder to predict than the benefits in immediate consumer satisfactions, or the costs in megadeaths of a nuclear Armageddon.

What this suggests to me first is that the time to begin systematic institutional planning for human development is now. A modest beginning has already been made with President Johnson's decision more than a year ago that the Planning, Programming, Budgeting System developed in the Department of Defense should be applied across the board throughout the Federal Government. Since that announcement, state and even city governments have begun to adopt the same techniques which essentially consist of three elements:

Development of a detailed five-year program, revised every year.

Presentation of the agency budget broken down by functional categories to show all the costs of each activity, instead of lumping together all personnel costs, all equipment costs, all construction costs, and the like.

Conduct of special studies comparing the costs and the benefits of alternative ways of achieving stated objectives, taking off from the information contained in the five-year program and the functional budget.

Supporters of PPBS, as it is inevitably called, do not claim it is a panacea. They are inclined rather to describe it as the systematic application of common sense to government decision-making. It is clearly something more than that, since it involves the collection and analysis of complex information and the examination of the full range of possible choices.

In fact, its critics point out that its use is severely limited by the limited availability of persons trained in systems analysis.

Another relevant criticism is that PPBS tends to overemphasize economic costs and economic benefits because they are most readily quantifiable, although in an affluent society economic factors should often be subordinated to questions of political feasibility and social value. Still, it does not seem sensible on balance that the decision-maker should be denied the information that PPBS can produce. What he needs along with the data derived from PPBS is an equally systematic and objective analysis of the political considerations involved in program choices.

As the architects of institutions to foster human development have adopted PPBS from the architects of defense programs, so they can derive a number of pragmatic lessons from the experience of planners, not only in Defense, but in foreign aid as well. Probably the most important lesson to be derived from Defense experience relates to costs, and probably the most important lesson to be derived from foreign aid experience relates to methods.

The cost lesson is, briefly put, that the best whole is not the sum of the best parts. The designers of each of the elements of a complex program or a complex institution are anxious to design the best possible element that they can devise. But the best possible widget is not necessarily compatible with the best possible frammis.

Besides, it will inevitably cost more and take longer to produce than its designer has estimated. And if all the widgets and frammises are designed to this standard, the total cost and the overall time schedule for the system will be impossible.

What each individual designer wants to do is called suboptimization, and it is fatal to the achievement of a workable system. This phenomenon has led my former colleague, Gene Fubini, to observe that if you are trying to buy a weapons system, don't buy the best because it is too expensive; don't buy the second best, because it will take to long to build; buy the third best.

The lesson for the designer of institutions intended to foster human development is clear: Do not seek to build a complicated institution out of idealized components.

There is a further corollary of this principle. Multipurpose institutions, like multipurpose systems generally, have a great deal to recommend them. They tend to spread costs, to discourage suboptimizing, and to make institutional structures more flexible. A multipurpose institution concerned with human development — a multipurpose community center in an urban ghetto, for example — is better able to see the individual and the family as integrated organisms and deal more effectively with the interrelationships among all their problems.

The idea of the therapeutic community which involves everyone who works in an institution from the doctors to the cleaning women in the process of patient care is a special case of the general proposition for which I am arguing. In a true therapeutic community, no one can afford to lose sight of the overall objective.

The companion lesson in method, again briefly put, is that if you want new institutions to survive for the purpose for which they are intended, you must from the beginning involve the people who are to benefit from them.

The Foreign Aid program discovered early that a school or a medical center presented to a community is not likely to be put to its best uses unless the people in the community are involved in the process of planning for it and deciding exactly how it is going to be used as well as in its actual management.

The same discovery underlies the principle of maximum feasible participation in the community action programs of the Economic Opportunity Act of 1964. If a program is to help poor people emerge from poverty through job training or employment services or health services or housing rehabilitation, they have first to decide that they want it and then to play some role in the program itself, whether as board members or sub-professional aides, but not just as objects of the program.

It may be worthwhile to try to apply some of these general statements about the role of institutions and the use of resources to a specific program. The idea that slum children could benefit from intensive pre-school education in order to be able to start out in school somewhat closer to the starting point of their better advantaged classmates was not perhaps an extraordinary insight. But it developed an extraordinary appeal very rapidly within the Office of Economic Opportunity and, thereby, was transformed from a mere idea floating freely in the void with other ideas into a program competing fiercely with other programs for inevitably scarce resources. As a program, it has to be carried out through institutions. And the institutions selected differed in kind and in quality from place to place.

My evidence about the results of the program is thoroughly unscientific, and, indeed, I suspect it will be some time before considered judgments can be made about the entire enterprise. But I have drawn two conclusions based on other people's accounts of what they have seen that, not surprisingly, illustrates my two principles.

Head Start Programs have been operated by school systems and by general-purpose community action organizations. School systems were logical repositories for the programs because the children were being prepared for school. Community action organizations developed Head Start Programs because they were interested in every kind of activity that could help pull people out of poverty.

One might suppose that school systems would be better specialized to the Head Start task. But, by and large, I believe community action organizations did better because they instinctively addressed the problems of the whole child and the whole family. They weren't just preparing him for an arbitrary set of tasks in a schoolroom. They were giving him what he had missed in life thus far. The multipurpose organization could do more for human growth and development than the specialized organization.

Head Start Programs also differed in the role, if any, assigned to parents. In some programs parents were regarded only as nuisances. In others, they were allowed into the classroom if they showed any interest. And in still others, parents were sought out in their homes by teachers and pulled into the classroom to participate in the program. Where parent participation has been fullest, there is the greatest hope for lasting benefits from the initial effort.

But there is another series of questions that needs to be asked about the Head Start Program. What are the total costs in scarce dollars and in scarce manpower to operate in on a significant scale in the United States? How much lasting effect will the program have on children who go through it? What would be the consequences of spending the same amount of money on a program of compensatory education for children already in school? Or on a program of day-care centers open only to the children of working mothers? Or on a day-care center program associated with a work-training and job placement program to permit as many ADC mothers as possible to become working mothers?

Head Start may be a good idea, but it may or may not be the best program to accomplish the stated objectives for the total cost involved in carrying it out. I suspect it is the best program for the purpose. But I would be better able to make this judgment if I could see even the roughest and most approximate cost-benefit studies. And in this subject-matter field, all cost-benefit studies are necessarily rough and approximate. Still, it is not enough to decide that Head Start is a good idea if you are going to select it as a program to be carried out instead of other programs that are competing within a budget of necessarily less than infinite elasticity.

The question of cost is always relevant in choosing program alternatives. But it is agonizingly relevant in choosing and carrying out programs that serve the poor. Poor people are people who, for whatever reason, are unable to make a sufficient contribution to society or to get others to make it on their behalf so that society is willing to reward them with a decent share of the common work product.

There is no reason to suppose that if society is unwilling to provide poor people with adequate shelter and even in some situations with adequate food, it would be willing to meet the cost of adequate institutions and programs to deal with the other problems of human development and particularly with the provision of necessary professional services and remedial activities.

One consequence of this institutional or resource gap is that new programs designed specifically to deal with the problems of the poor face a threshold problem in their lack of sufficient reserve capacity to meet the demand once the availability of their services becomes known in the area where they operate. Traditionally, programs for the poor have dealt with this problem by lowering the human, if not the objective, quality of their services.

Legal Aid, for example, has drastically scanted interviewer time — particularly important in dealing with relatively inarticulate clients — and has often ruled out certain forms of relief sought by lawyers for paying clients: divorces instead of separations; bankruptcy proceedings, discharging the client from debts he cannot pay, instead of informal debt composition which may be less offensive to local merchants who are Legal Aid supporters.

Some medical clinics have effectively discouraged unmanageable demand by making the preconditions for getting to see a doctor both time-consuming and generally repellent for persons easily repelled by unfamiliar institutions.

The new wave of institutions which reach out for clientele coming into their own neighborhoods, opening store-front offices, sending their representatives into people's homes, has been squarely confronted with the problem of providing enough service to meet the demand. One neighborhood law office operated by a large university law school under a grant from the Office of Economic Opportunity has looked at the potential demand for its services, asserted a firm policy of not sacrificing the professional quality of its services or the amenities of the lawyer-client relationship, and concluded that it would have to choose between taking clients on a first-come, first-serve basis, and excluding those who came too late to be served, or giving priority to clients with cases that promised to provide precedents, test cases that would determine the law for others.

There are arguments on both sides of this choice, and neither is really satisfactory. The Office has not yet developed to the point where it will be forced to choose, but the time is probably not far off.

For neighborhood medical and psychiatric clinics, the resource gap can be even more acute and more painful. Perhaps there are some kinds of problems that can be turned away, but turning away any problem is difficult for a service that purports to treat the whole person, not one particular set of symptoms.

The kind of economic analysis that points the way towards more effective use of scarce resources cannot resolve the problem of the gap between the available resources and the clear and present needs of urban slums and ghetto residents. The need is just too great, and the resources too limited. Frustrated by economics, some observers have turned to the law to close the gap. They argue that the various helping services society provides, from welfare payments to compensatory education and free medical and legal assistance, should be treated as property rights.

The advocates of the New Property have administered a useful shock to the legal system by pointing out that for too many people in our society, the old idea of poverty has no relevance because they have no claims against others that society is willing to enforce on their behalf, and they see no prospect of acquiring such claims. But it seems to me that the New Property advocates don't realize how little the law can do to create substantive rights, to change a relationship of dependence by fiat to one of free and independent expectation of benefit.

Clearly, the law can change human behavior, and change it both radically and rapidly. The effect of the public accommodations provisions of the Civil Rights Act of 1964 is the most recent and dramatic demonstration of this proposition. But the Civil Rights Act used the principles of freedom of movement and equal protection of the laws to protect people who wanted to exchange their personal property in coin of the realm for meals or accommodations. No new property right was being created; rather the exercise of a property right was being protected.

The law can be quite effective in protecting people who have claims to assert, in giving a competitive advantage to one side or another in a bargaining situation. Utility rate regulation, wage and hour and collective bargaining statutes, fair employment practices commissions, all change the terms of what had been an unequal bargaining situation. But in each instance, for the man at the short end of the stick. He can, under sufficient provocation, take his marbles and go home.

The law can also create substantive benefits for citizens as in the Aid to Dependent Children program or veterans pensions or Medicare. These benefits can be accompanied by more or less demeaning conditions, sometimes much more and sometimes much less. But they cannot in any meaningful sense be made the property of the recipient before he receives them.

You can tell an ADC mother that she has a legal right not to have her payments interrupted, but, as Joel Handler points out, she knows that after the payments are resumed, she will have to persuade her case worker to let her have a special allowance for her children's winter coats.

Even the Medicare patient knows that he will have to get along with his doctor. And so long as the schedule of fees is fixed and there is a general doctor shortage, his rights are less than absolute. In fact, it is not the possibility of a theoretical property right in his benefits that makes a difference to the beneficiary, but rather the practical conditions that the law attaches to the benefits.

The lesson to be derived from the idea of the New Property is rather, in my view, that people who are essentially property-less in our society need to discover for themselves that they have something to bargain with before they can get the benefits of a system of law. If they have no economic power because they have no property, not even in their own labor, which they haven't yet learned to apply in order to get and hold a decent job, they can discover the most elementary political power that comes from joining together to demand better garbage collection or police protection or job training opportunities or health services. They can form organizations of their own.

I suspect that concern with political power accounts for a good deal of the current fascination with neighborhood corporations and development corporations and nonprofit membership corporations. A corporation is a symbol of organized economic power, and the idea has special appeal for people who are economically powerless and are beginning to sense the power of organization. There is a special place of honor reserved in this hierarchy for the "Comsat-type corporation" which is thought of not as a special and somewhat awkward device for dealing with a special regulatory-cum-foreign policy problem, but rather as the corporate form applied to a particularly noble purpose. But the appeal of the corporate form is the appeal of legally recognized power.

At some intermediate level of political sophistication, this organizing drive reaches for the power of the ballot box. But even before it does, and particularly in the early stages, law and lawyers can be helpful, not in creating new claims on society, but in showing people who have never made claims where and how they can best present their case and helping them to invoke the legal rules of more or less fair play. It may be that in the process of human development a man who has always been a passive object of society's benevolence or disdain has to learn to be an actor in a simple neighborhood political arena before he can be an actor in the market place of jobs and job skills.

Which is where I come back to the shape of institutions for human development.

The process of shaping these institutions, then, must take account of their role in helping the people they serve to develop a sense of political power because political power is going to be necessary to find the economic resources to permit these institutions to function effectively. None of this is to say that you should allow your judgments as experts to be overborne by majority vote of those whom you are trying to help.

It does mean that you can only help people to grow by working through effective institutions to which adequate resources are allocated and intelligently used. Building those institutions requires resources that are not easy to attract. Simply by improving the effectiveness of institutions for human development through analytical planning techniques, you cannot get out of the vicious circle containing the groups that lack the capacities to develop their own economic potential so they can provide the resources to support the institutions to help them develop their capacities.

I suspect that the way out of this circle is to show them they can use their political power through institutions they construct themselves in order to obtain the resources for more adequate institutions.

Human development depends, I would suppose, on a sense of one's self as a person acting on other people and not merely being an object of other people's actions. I understand there is a computer programmed to counsel high school students which ends its interview by observing, "It's been fun interacting with you." Interaction is, I take it, even more important for people than for computers.

An important part of your task, therefore, as participant-observers in human development is to encourage the development of institutions through which people can begin to realize their human potential. If this seems beyond your capacities or your interests, let me remind you with Emerson that "Action is with the scholar subordinate, but it is essential. Without it, he is not yet man."

SAMUEL POLSKY, LL.B., PH.D.

We have grown so accustomed in recent years to focusing on civil disobedience, and perhaps on its more powerful older brother, group resistance, that simple dissent may seem old fashioned, and mere divergence perhaps almost effete. At the risk of both my male image, and my tenuous claim to modernity, I intend only to diverge in some particulars from Adam Yarmolinsky, and to dissent in a few instances.

Yarmolinsky suggests, first of all, a "cost-benefit" approach, modeled along the lines of the Department of Defense "Planning, Programming, Budgeting System", PPBS, and states that the case for it — which he states cogently and powerfully — is applicable to human development planning. I agree that the days of PPBS have arrived and that the system will undoubtedly proliferate. I leave its merits to others — perhaps to the economists. Does it, perhaps, have weakness and dangers?

I know that for our future, not only are death and taxes certain, but equally certain, they will be preceded by the bookkeeper, accountant, comptroller and the systems analyst in increasing measure.

I echo and underline Yarmolinsky's work of caution, however, when he says the benefits of alternative resource allocations are extraordinarily difficult to measure in human development because the precise goal is by definition hidden in the future, and is not precisely predictable. Indeed, I go a bit farther and say that the goal in the Department of Defense, at least, is relatively clear and relatively unitary whether by nature or by executive mandate.

In human development, the goals are not only multiple and complex, but they are also often in conflict. That makes the ice of chance far thinner than in military development. We shall have to skate on it in any event — not waiting for human development to crystallize, but not venturing foolishly before social policy has congealed.

Yarmolinsky's second theme is one that I would like to consider in more detail; it is concerned with "methods". He notes that the best whole is not the sum of the best parts, and that what each individual designer wants to do is called "sub-optimization" — a process that is fatal to achievement of a workable system.

But — and I think the "but" has to be underlined — the obverse of that coin is that a system that does not allow for some sub-optimization will in time become sterile. And in today's world, that will happen sooner rather than later.

Putting it another way, we are warned not to seek to build a complicated institution out of idealized components; but the contrary admonition also holds: some components had better be idealized, or the system will be a massive monument commemorating incompetence.

We are told that multipurpose institutions, like multipurpose systems, have a great deal to recommend them. But multipurpose systems, like multipurpose tools, rarely can do as good a job with respect to any single function as can the specialized tool.

We are advised that multipurpose organizations can often do and generally do do more for human growth and development that the specialized organization. The point is, however, that we need both. I suspect that in the long run, using both approaches is cheaper than using either alone, because each tends to test and correct the excesses of the other.

The analogy in research is instructive here. None of us would be satisfied with a research hypothesis, however well borne out it was by data, if we couldn't test it out by postulating the contrary hypothesis, and seeing whether the same data wouldn't support that conflicting hypothesis. Can we do less in testing an action hypothesis?

My suggestions have really been statements of the contrary action hypotheses. I think the collection of uncertain, incomplete and unreliable data that we now have before us supports not only Yarmolinsky's thesis but also the opposite hypothesis. Unfortunately, that is not good enough. We must collect better data; and perhaps some of you can see the insidious seeds of the plea for research in addition to action, being sown here. If you can, you are right, that is exactly what I am aiming toward. I think that research as a first step is inevitable; we can't do anything to avoid it without getting into deeper trouble that we are already in now.

We must gather more reliable and complete data, and must also test out further the variable hypotheses. Let us try several in competitive action, and see which in operation and in practice and by experience seems to work best, if we can't conclusively establish in advance that one is the best.

In short, I am suggesting the use of multiple models of action-research, rather than focusing upon a single model limited to action only. I would be even happier to have research precede action, but I am willing to accept the alternative of action-research because the need is immediate, and we can't postpone meeting it, provided we test more than one model.

Applying this concept to specific legal institutions as Yarmolinsky has done, our attention is directed to Legal Aid. He points out that as the extent of legal services is increased, the human quality tends to decrease, if not other qualities as well. I think he is being kind in the restraint of his understatement. He gives as an example the scanted time devoted to the interview.

May I take a moment and comment on the example in terms of research applied to the interview. Our research unit in legal psychiatry some years ago devoted a considerable amount of time to examining what happens in the legal interview at the Legal Aid level. We found a number of interesting things:

You could give unlimited time to the interview, and it didn't really make a great deal of difference, because these young men, who in one year would be out in practice, hadn't been taught anything about interviewing; and they are not now taught anything about interviewing, despite the fact that it is the first tool the lawyer uses in practice. We found that it didn't make a great deal of difference whether the interviews were lengthy and repetitive or short and infrequent, because how time is spent is far more important than how much time is spent. Protracted misspent time is not better than condensed misspent time.

In the first place, they didn't know how to interview. In the second and more important place, frequently, we had situations of paramount concern to you in terms of human development: where emotional problems were masquerading as legal problems, or where emotional problems thrust a secondary legal problem to the fore and hid the primary legal problem.

This was and is particularly true when dealing with the family law constellation of problems, such as support and custody, or problems of juvenile delinquency as they affect the family unit. People often come to Legal Aid to unravel what, in terms of presenting symptoms, may seem to be a legal problem, but is often a basic emotional problem. No matter how knowledgeable the interviewer is in substantive law, and how much time he has devoted to the case, his effort is never going to result in a closed file, because somebody else needs to deal with the underlying real problem which is not a legal problem at all.

The legal problem will disappear only if the real problem is dealt with and that takes a different degree of skill and, indeed, rquires that other individuals come in and participate. Only in this way can we deal with the realities, and not simply with what the poor, untrained, confused, unskilled, uncertain, and anxious layman happens to bring us prelabeled as a problem of law.

Unless we begin with the research, or unless the research is implicit somewhere within the operation, practice is going to suffer. Adding more bodies at the legal level to do more interviewing will not obviate the problem of a scanted interview, nor will adding more time to each interview, as in the best law offices, where fees are paid commensurate with time expended.

If our attention is directed to research that improves the institution or some part of the institution — in this instance, the legal interview as the example — less time devoted to the process may be more effective and better than more time devoted to it. It is not just a problem of time or money; it is a problem of effectiveness.

Still, again, if the resource gap is great, we face, as Adam Yarmolinsky has suggested, the dilemma of that unnamed law school with its legal aid clinic that had to choose between taking clients on a first-come, first-served basis, and giving priority to cases that promised to serve as test cases, or class actions or new precedents. He is quite right, budgets and money are not infinitely elastic. However, you can do all of these things if you don't do all of them everywhere at the same time. There is every reason to encourage one model in one city and another in a comparable city, while we test ultimate policies or goals or models, one against the other. That is another form of action research.

For example, instead of the community legal service models now in use, half a dozen variants might be tried out in different cities at the same time. It isn't necessary to have just one model. We can have some communities where perhaps only the Bar Association will furnish services; and others where only institutional agencies already in operation such as Legal Aid and the Defenders Office furnish services; and still others where the poor themselves are given a fund to work with, and they can go out and spend this money as seems best to them, just as we can spend our private money in purchasing legal services. These variations could test what we have established as a single model without variation: the Community Legal Services model where the poor, the Bar Association, and Legal Aid are all represented in a troika fashion, each with one-third of the power on the Board of Directors. In using a single model, we have simply stifled the possibility of effective additional research.

There are dozens of other significant areas of legal impact upon human development. I intend to name a few, although it is perhaps unfair to do so. What I would focus on, because I think they are much to the point in terms of human development, are such problems as therapeutic abortion, birth control, artificial insemination, human transplants, informed consent and euthanasia. In all of them, without delivering another paper, social policy is not fixed, nor is legal policy, nor is medical policy. Furthermore, the interaction among these policies is in major flux.

LINCOLN E. MOSES, PH.D.

A theme which has appeared increasingly frequently as the conference has unfolded is the question, "What should we be doing — action or research?" A number of people have voiced unease about doing one and not the other, or the other and not the one, and often with evident feeling.

After thinking about this for awhile, I'm inclined to believe that the dichotomy, "action or research", as related to the concerns of this conference, is false. For one thing, few people are actually in a position to choose one of the other of these two kinds of endeavor. Not many people who are researchers face real, attractive options for action, and not many program people face real, attractive options for doing research. Not only at the level of participants is this rarely a true choice, but I imagine that even in the area of funding it is not a true choice. Research programs and action programs tend to be handled through different agencies or different parts of agencies. Finally, action and research, at least at the first instance, undertake to satisfy different "publics": the audience to which research is addressed is largely the audience of peers of the writer; the audience to which action programs are addressed is more nearly some part of the "real world". So I doubt that the question, "Action or research?" is a fruitful question.

It is clear that these two themes are strongly connected and some question like how most profitably to have action *and* research is a real question; I hope to make some useful remarks about that now. Of course, each of them needs the other. Action, intelligent action, in a new and complex situation can often be better informed if certain questions have been adequately researched. I heard in the halls the other day one person say to another, "This is the third go-round on this kind of (action) program and we're still asking the same questions we were when we began 15 years ago." That person was speaking of the need for illuminating action by good research. On the other hand, as every research worker knows, interesting and important problems for scientific study are real prizes, and the man who identifies such problems is very often an imaginative man. But in the presence of much action, the imagination can be stimulated. All kinds of new topics "turn up".

I'd like to emphasize the respectability and central importance of this question — how best to combine research and action. Approximately, this poses the riddle of how best can we learn from experience.

The first thing we know about how to learn from experience is that an overwhelming mass of data is not sufficient to provide any valid information at all. Sample size is not enough. We have no need here to appeal to the *Literary Digest* poll (a standing temptation to any statistician). We can instead take a real live case from the recent past.

In the late 1950's a new anesthetic agent was developed. Its name was halothane. It had many properties that commended its use — convenience, pleasant flavor, versatility, non-combustibility, etc. And it quickly swept into widespread use, so that within a few years it was used more than any other single major anesthetic agent. At the end of about four or five years of use, when it had been given perhaps ten million times in the United States, several questions suddenly came to be asked — "Is it as safe as other anesthetics?" "Is it true that it actually is followed by less nausea and vomiting?" Now here were ten million instances of the administration of the drug, all with medical records. Some of this medical information was actually in a moderately accessible form and yet no solid answer was known to any of these questions after ten million administrations! A task force was organized to answer the first question, and eventually yielded answers which were probably as good as the quality of the data would permit. But had the experience been organized to keep track of the answers to such questions as experience was being acquired, the task force might never have been necessary. The answers might have been better known, and much sooner.

Another fact about learning from experience is that questions affected with wide public interest are notoriously hard to answer in this way, for at least two different reasons. First, there may be economic or political interests which interfere with the design of the program, so that it will not permit valid scientific conclusions; I think this difficulty marks a good deal of the work which has been done in cloud seeding. Second, if there are enough passions widely involved in the question, then standards of scientific rigor tend to be artificially distorted. Here I think I may justly adduce the lung cancer and smoking controversy as a case where better than ordinary evidence is still often decried as scientifically inadequate. Both kinds of problems are likely to be lurking in areas of public spending addressed to social problems in the United States in the next decade. But despite all these difficulties, ultimately we must believe that one can learn from experience. This challenge is an inviting one which will require our best efforts.

Certain characteristic kinds of scientific issues will be frequently encountered in research-with-action. Let me say a little about those. The research conclusions that come out of a program will have the general structure of stating, "If you do this, you get that kind of a result." Or, "If you do this in comparison to that, you get this kind of a result in comparison to that kind." For such statements to be useful, it is necessary that there be a clear "exportable" definition of what is meant by "do this" or "do that". This problem of adequately defining the treatment continually plagues studies of an empirical nature and has been recognized at least since the time of the Hawthorne study. And, of course, choice and description of the "result" must be satisfactory — not only should it be unambiguously defined, but, more important, it should be chosen to be an important result. For example, a training program directed at increasing employment in a certain class of worker could choose as the "defined result" any of the following, arranged in approximately increasing order of importance and decreasing order of verifiability: (1) completing training, (2) passing an examination necessary for admission to employment of the type under judgment, (3) being placed for that type of job, (4) still being employed at that type of job one year later.

One other scientific problem which is well known to us all but which we cannot escape without great effort and which we must continually worry about is that of selection bias. If one procedure is applied to one group and another to another, and then different results are found, we must have some sound basis for deciding between the two explanations that the treatments were different, or the groups were different. This can be argued *post hoc*, but far less persuasively than if arrangements have been made at the beginning to ensure that the groups are not different. I hope you can hear in this the statistician's plea for using randomization when it is ethically and administratively possible.

There will be certain characteristic problems of administrative kind affecting research done in action programs. The immediate goals of the two kinds of effort will sometimes be in conflict, and the two kinds of work will be in competition for funds, etc., if administered under one head. It therefore seems natural to have duplicate forces cooperating in action programs intended to yield research findings — the action team and the research team. They should probably be separately financed. They should report to different superiors and different parts of the funding apparatus — e.g., different bureaus perhaps. But they must be closely articulated in their day to day contacts. Policy committees of either group should routinely have members present from the other, for example. There may be occasional people who could be half-time employed in each group; if such people are fortunately chosen, they are likely to be of considerable help in ensuring actual coordination.

In closing, let me say that the broad issues involved in research-and-action in social programs seem to be similar to those in clinical research. It is a truism that a great deal of what we have learned about medicine has been done without the benefit of statistics and more or less without benefit of science. It is also a trusim that this learning process has entailed false starts, much waste of effort, and delay in arriving at what eventually comes to be seen as true. In the past twenty years or so increasing use is being made of such things as the randomized clinical trial with very good effect. But medicine, too, still has before it the main part of the task of learning best how to learn from experience. Developments in this area are likely to be among the most exciting of our times.

DISCUSSION

VAUGHAN: Dr. Moses has indicated that action research too often consists of a lot of action, including data collection, with observation of results, followed by a publication. Earlier today, Harriet Felton referred to the Children and Youth Programs, in which it is proposed that a service program have built in to itself a continual process of evaluation and that this evaluation provide feedback controls on the service itself.

This may be a little easier to do in the kind of program which focuses upon certain specific health needs, such as the number of children in a given community who are inadequately immunized or who are having one or another kind of illness, or are making this or that kind of progress in school; but there may be other situations where the same thing applies: that you build a continuing process of evaluation of output that feeds back into the planning area and modifies the way services are offered.

Is this action research? If it is, what is wrong with it? And if it is not, what do we have to be on guard against?

MOSES: I don't know whether that's action research. As I said, if action research was a question of collecting records and writing up what you meant, then, it was not what I was especially pleading for. I was pleading for something much more like what you have just said, much more like it.

As to the difficulties, first of all, there may be none. But if there are some, they are likely to be of this kind: that you will have a hard time knowing who to compare the people who received the treatment with. If you compare them with the untreated, you leave open the question whether results depended on the treatment or on the recruitment into the treatment group.

Assuming that such matters are carefully thought out in advance and provided for, then the thing that you have just mentioned is exactly what I feel will greatly increase the value and the potential of unfolding programs of action — to pose thoughtful hypotheses and test them as you go along. If that is action research, then I hope I haven't blackened its name by the negative cast of my remarks in connection with it.

POLSKY: May I timidly suggest what I thought action research meant, at least in the medical-legal field? It certainly isn't just the extensive accumulation of records accurately kept and ultimately published. At best, this is not even data collection. I think that you rise to the level of research quality in data collection only if you do what you suggest and have some kind of a feedback and some kind of an examination of what it is you are collecting so that you are not just a copyist with respect to facts. But that is only the first step.

In the medical-legal field, at least, the next step is the establishment of variations, introduction of some variables, with different methods in operation at different places and with accurately kept records, and with feedback. You will then develop other kinds of data for comparison with the first for whatever appropriate purpose. This is a tough proposition, nothing like the establishment of controls in a laboratory situation, because you can't do that with human beings and human institutions.

Then we have the third and really tough part of the whole business: trying to frame the questions that should be asked of this kind of comparison. You don't get instant answers out of this, but you reach the point where maybe you can begin asking the right kinds of questions. If you begin framing the right kinds of questions, a lot of people are stimulated to refine and change your questions and to try to find answers to their questions derivative from your questions.

That is the beginning, at least, of research. Since it grows out of action programs, I think that could be called action research. I wouldn't want to limit myself to it. But it seems to me that if we need answers here and now, both in law and in medicine, then let's not go into action just by accepting what seems *a priori* to be a good way of finding answers and by mobilizing all our money, all our resources, to engaging in the same action everywhere. Let's rather try to introduce that which will stimulate research ultimately. If we have to give it a name, call *that* action research.

FELTON: Are you referring to evaluation now?

POLSKY: Yes, I would say there is evaluation built into each one of these different kinds of models. You establish the evaluation of the data as you are collecting them, to determine whether you are really collecting something useful. You make mistakes in doing that, but you have got to try to do it. But that in and of itself is still not research as far as I am concerned. It is a first step toward research — good data collection.

ALDRICH: The discussion we have just heard as to what action research is and where it should be placed has always been to my mind an integral part of the planning process. One of the difficulties that planners find themselves in more and more today is that they haven't done this kind of action research, to crystallize the problem and at the same time engage the minds of people in the political arena. If you do find a hypothesis that needs to be tested, you must not only have the plans, but you must have the preliminaries and be hooked into the political process.

STIVERS: May I ask Dr. Moses if there are recent statistical developments that would help us carry out research tasks in connection with action programs?

MOSES: Well, I was trained as a mathematical statistician; and the longer I am in the business, the simpler the tools I tend to use. I have about reached the point where I think that the hardest job of all is adequately to describe something in such a way that it is at the same time correct, faithful to the facts, and interpretable. The importance of this can be seen in the following way:

Suppose that you were given enormous samples so that there was no question of sample size. The only jobs you would then have would be arriving at insightful description and coping with sampling error. Somehow, when the statistical books discuss what to do about the sample error, it is wrapped up in statistics or confidence limits; but I think that the real problem in hard empirical research is getting the right description.

Now, there is actually one very important and useful new addition to the statistical armamentarium. There are a couple of papers on it in the *Annals*. It is a sort of all-purpose statistical device called "The Jacknife", composed by John Tukey and it will be published in the *Handbook of Social Psychology* by Frederick Mosteller and John W. Tukey, in the chapter Data Analysis Including Statistics.

The name was carefully chosen by Tukey to suggest that it is a kind of usable tool, not necessarily the best for any one purpose, but usable for an incredible variety of problems for which it is sometimes hard to get more precise instruments.

GABRIEL D'AMATO: This symposium has brought together so many disciplines that it has idealized or at least looked forward to the possibility of communications crossing over disciplinary boundaries. I would like to comment on the possibility that some of our problems are related to linguistic difficulties. As Indo-Europeans, we are limited by the fact that our language does not have polar words, words which in a single symbol can embrace diverse fields, or opposite and disparate ideas.

For example, we can say "dependent" or "independent"; but there is no word which at one blow conveys the "dependent-independent" dichotomy or continuum. We have to create a pictorial symbol for this.

We could go on to light-dark, happy-sad, conservative-radical, and so on, and develop all sorts of polar opposites and discuss these. And we apologize for not being able to know more about the boundary of partner's own particular provincial discipline! I wonder if some of us who have time and interest could not explore the possibility of overcoming this obstacle.

Another comment entirely separate is that whereas we have been so much involved at this meeting in growth and development and life, I have myself been wondering about cell death. Is there in the genome possibly a program for the destruction and the orderly disappearance of cells, locally or generally within the organism, from the beginning of life? Isn't this an interesting problem? Shouldn't we pursue this — the bearing of cell death on morphogenesis and growth and development?

ALDRICH: I think this is one of the most important problems that people are considering who are seriously involved in biological research having to do with the aging process.

I agree that the notion is important that viability, vigor and the like, may be closely related to what is being taken away by cell death in various organ systems. This leads me to suggest that the term "human development" ought to include this aspect. I don't see how you can separate the process of aging from the process of growth and development.

A. FREDERICK NORTH: I want to grasp this idea, because I think it's so fertile, and transpose it into the psychological field. We have talked about development as an additive product just as we have talked about growth as an additive product. It is clearly implicit in the same concept of death that we must unlearn, forget, in order to grow. It is hard to change an old person; not because he can't learn new tricks but because he can't unlearn the old ones. It is hard to get rid of the old garbage in order to put in new.

The immutability that we were talking about, the biological Freudianism or Calvinism that pervaded some of our talk, is related not to the inability to make additional changes, but to the fact that this impetus to change, occurring now in a developed organism, makes such a small impact that it hardly counts, because old stuff doesn't make room for it. I think we are in the same area psychologically as you have implied that we are physically.

SUMMARY COMMENTS

ROBERT A. ALDRICH, M.D.

In sharing with you the things that have come through most clearly from this Symposium, I will mostly mention the large issues and some rather large gaps that could perhaps be dealt with in future meetings.

One of the first tasks identified by this conference is the need to define human development. The concept itself needs clear definition and we must express our ideas about active application of this knowledge on the one hand, while considering theory, on the other. It seems to me that this is both a dilemma and an issue deserving first priority.

It has been suggested that "human development" implies a goal-seeking process. This point of view has to be examined carefully. Bernard Kaplan, you will remember, asked whether perhaps human development was not the observation of the history of man. A number of such views need to be put together in such a fashion as to make human development understandable to many more disciplines.

In some of his testimony before Congress, Daniel Moynihan discussed evaluating the effectiveness and the utilization of legislation. This gets at the matter of action research—at the evaluation of our performance. What does society do with new legislated programs, or for that matter old legislative programs? This evaluation process or social report on human progress ought to be part of our definition of human development.

Another aspect of this consideration of human development would be to suggest the inclusion of the arts and humanities. They should be in greater evidence in such symposia. Quite a bit of the time, we have found ourselves dealing with values, value judgments, or value systems. Also, we have talked about ethical issues on several occasions, including this afternoon. It seems to me that the philosopher, the historian, and many others, particularly in the arts, drama, and literature could be very helpful.

There is good evidence for believing that when a society or a culture begins to move in a new direction, or when there are questions in peoples' minds about whether the society is fulfilling their dearest values, that it is often the artists and writers who note this first. The general mass of the public sense the trend later. It is not usually the scientists who first recognize these changes. And so, in further defining human development, we should make a special effort to include artists and those who represent the humanities.

The hard sciences also deserve a place. Let me illustrate why. Warren Weaver, a mathematician, made an important contribution to modern thought when he wrote in 1948 about what he called organized complexity. He expresses to my satisfaction the primary principles that one would need for an interaction science named human development. Another example is the analogy of Heisenberg's uncertainty principle in physics, to many biological and social phenomena. Here, again, are points of view from other disciplines that may be most useful to biologists.

A second main thrust that comes out of the Symposium, is the need to greatly expand public education; for adults, and right on down to the youngest child. There are about 20 or 30 different issues to be dealt with in programs of public education. For example, parents and future parents ought to know about the things that Jerome Kagan has told us. They should understand that malnutrition may have an effect on the offspring, including the function of learning.

We have heard other fine contributions appropriate for public dissemination. We should be presenting what we know about human beings to the young people who are the parents of the next generation. After all who has a greater vested interest? This would help them to do a more realistic job of establishing and conducting family life.

One element of public education that should have a major role in future symposia is the impact of the communications media. All of us must examine the impact on children of violence seen on television and how this influences the patterns of activity for children and adults. Here is an important subject, which I think in many ways Marshall McLuhan has faced and expressed very well.

Public education about child rearing (in our context) has been left out in the instruction of many contemporary parents. Those in their 20's, 30's and 40's know little about child rearing except what they themselves have experienced, or received second-hand a long time ago. I believe there needs to be a reexamination of parental child rearing concepts and re-education for parenthood.

If this is done, I hope we can avoid the *social parthenogenesis* that we have been espousing for so long. Even in this symposium we speak almost entirely of the mother and very rarely of the father. This is a serious mistake. The Children's Bureau could easily change the title of Maternal and Child Health programs to Parental and Child Health programs.

The third major issue is the need to learn about the learning process itself. Is this a genetic process? If so, how much of it is genetic? How much learning really cannot be avoided? How much might optimally be acquired? I do not think anyone seriously doubts that there is a genetic component, or that there is a substantial environmental component. But we do not know much about the relative weight of these factors. In this regard, the comments of Reginald Lourie are very appropriate. He reminded us that we need to know more about children who can get by or do very well with only scraps of what we would call an appropriate normal life experience. These children must have been endowed with some kind of built-in guidance system. We would like to compare these sorts of people with those who need a tremendous amount of guidance and stimulation. We need to know why there are these differences.

The fourth point I would like to mention is the matter of ethics—in the study of human beings—the need to develop a philosophy about and to create public policy governing research on human beings.

Some who are clinicians have undoubtedly wondered on occasion what the implications might be of certain kinds of experiments—on children. We are quite ignorant about these. René Dubos' illustration that modest changes directed to the animal mother induced measurable changes in the biology of the offspring is impressive. Similarly, under this rubric (ethics) we need to examine the ethical and moral basis for the intervention of society into the family. I see no alternative to a certain amount of intervention. But, in many communities where people want to "do something for the underprivileged", they have simply invaded the lives of the underpriviledged like men from Mars. They are being rebuffed. We need to be aware in advance of the value systems of people about to be "studied" and to find out whether the proposed intervention is acceptable or not, and, if not, on what basis it might be made acceptable. Here is a very difficult matter to legislate. Can we gain a better definition of values for families and people that live in cities? Aristotle said that the purpose of a city is to make man happy and safe. I would add freedom as another implied value. How refreshing it would be to have a general set of values for people who live in cities. One could then ask whether we have the technology to make our cities adjustable to the values of the city dweller.

A fifth topic is the need for a new and improved nomenclature. Whenever you see a mix of physicians, social scientists, biologists and others as we have here, it is intriguing to watch them try to learn each other's languages and begin communicating. Throughout this conference we have been multilingual, some people learning new words that were precisely defined in other disciplines, but utterly meaningless or grossly misinterpreted by others. The bioengineers are hard at work on a new nomenclature in biology because they find as they work with computers to organize information, that difficulties arise because the language used in biology and medicine is imprecise and peculiar.

The problem of nomenclature for human development must be faced now.

Sixth, is the subject of interdisciplinary research. Almost everyone agreed that if human beings are the substrate for human development research, we are going to have many different disciplines converging on this substrate with many interests. This means research by an interdisciplinary group that is scientifically multilingual.

An important principle stressed yesterday, is the probable difference between the kind of scholar who likes to try to "put man back together" and the scholar who likes to take him apart. There may be important personality differences. If synthesis is desirable, it does not make sense to have the facilities of universities committed too far in the direction of taking things apart. We may have to try to get more of the "put-together types" back into the universities and give them an opportunity to work at human development. This is part of the puzzle that René Dubos underlined in his very elegant plea for new institutions.

I will close by saying that the real question before us, is what we want man to be like and what we want the world to be like. This requires theoretical considerations as well as applications. We *do* need a new approach. The expanded dialogue of these four days ought to be repeated frequently in a variety of forums as often as possible throughout the country. It is particularly important that this kind of dialogue be introduced into the thinking of the political structure, to the man in the street, and specially the men whom I call the managers of society, the industrial or labor leaders, professional leaders, and anyone else whose vital interests would be served by further knowledge of human development. In other words, anyone who will listen to the future needs of man and his environment.

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